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VICTORIA – AUSTRALIA

VOL. XXXI PART 10

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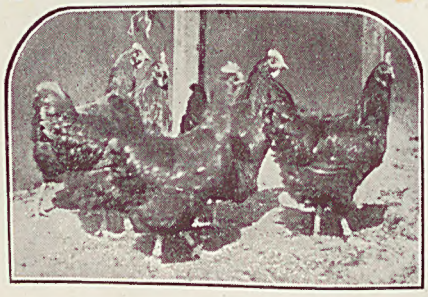

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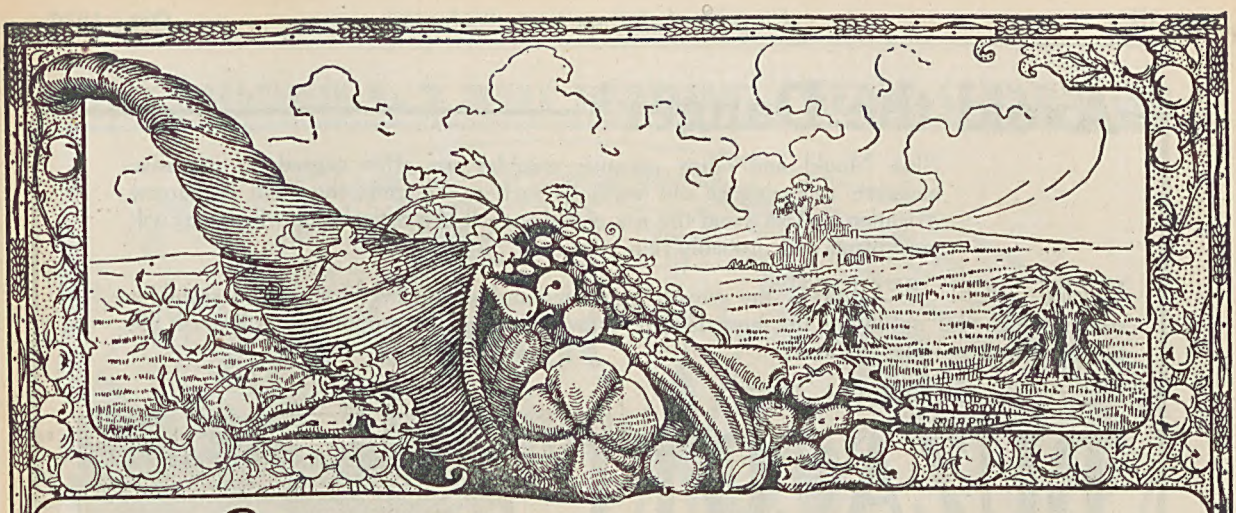

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Issued under the direction of the Hon. J. Allan, M.L.A., Minister of Agriculture.

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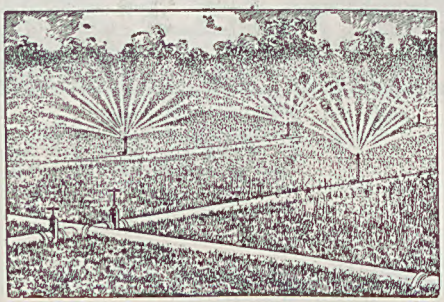

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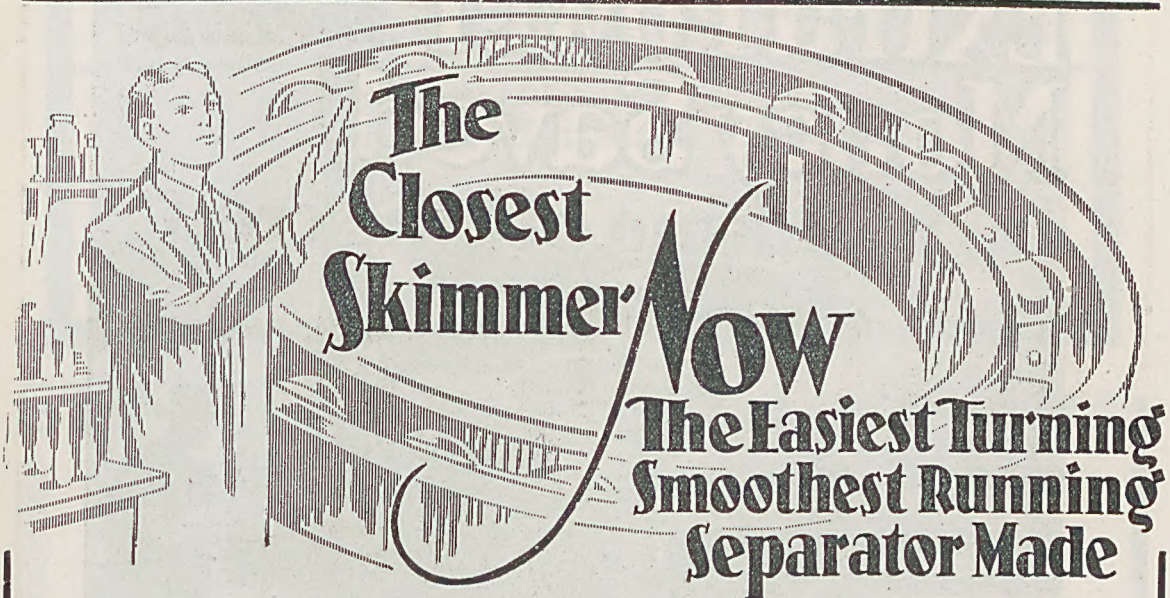

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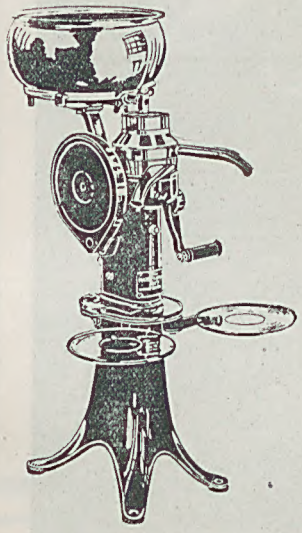

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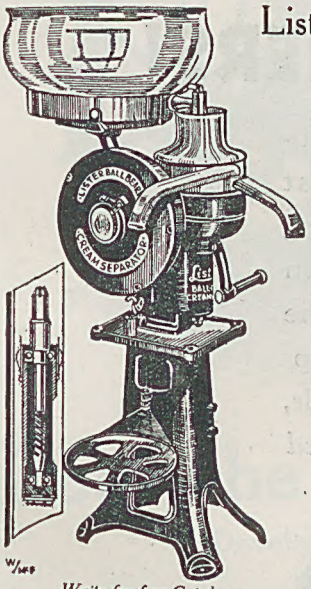

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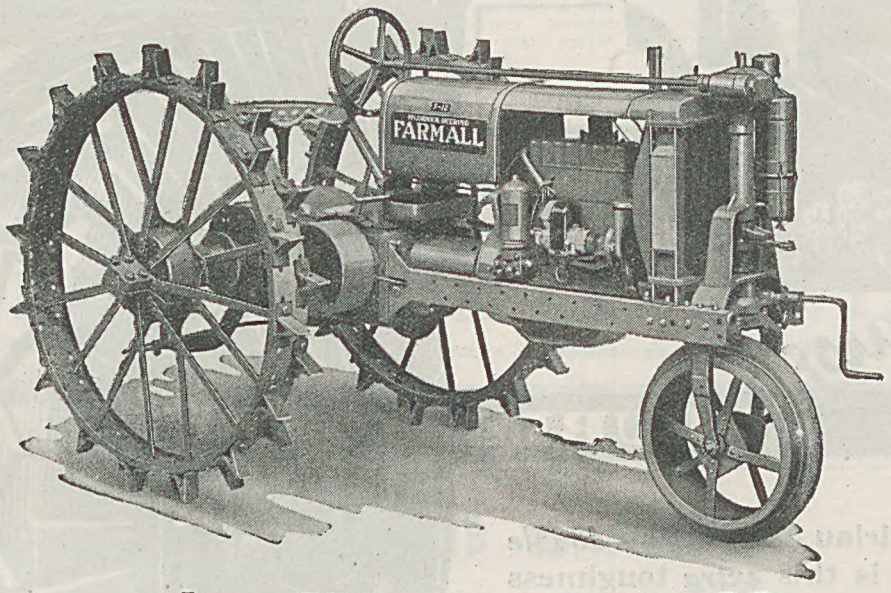

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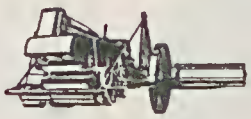

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The Journal of the Department of Agriculture of Victoria

Tobacco Experiments

Results at Shepparton

By W. J. B. McDonald, Assistant Inspector of Agriculture.

IN view of the rapid expansion of the tobacco-growing industry, the Department of Agriculture during 1931-32 established at Shepparton a series of experimental plots, designed to furnish information for growers on such questions as the most suitable varieties and manures.

In view of the little work that had been done, and as a preliminary to the laying down of the various tests, it was necessary during the first year to determine the optimum size and number of plots required to furnish the most accurate results under conditions comparable with the worst under which any succeeding crop might be grown.

The first-year investigations showed that the most convenient lay-out, combining economy of space with accuracy, was that each plot should consist of a single row of 50 plants, and that all plots should be replicated or repeated five times at random intervals throughout the area devoted to any particular experiment.

In the following season manurial, variety, and suckering trials were laid down on this basis. Each plot consisted of a single row of 53 plants, and was repeated five times. With the exception of the manurial trials, the site of each experiment was top-dressed with 5 cwt. of super. per acre, which was worked in with the cultivator a few days prior to planting out.

In the manurial trials the fertilizer was distributed by hand in furrows, which were opened up exactly on the site of the proposed plot, and were later filled in by using a horse-drawn scuffler as a hiller. The plants were then set out over the site of the furrow.

Manurial Trials.

These plots were planted with the variety Hickory Pryor on 8th November, 1932, but, owing to failure from blue mould, these plants were ploughed in and the area re-planted on 14th December with Warne plants obtained from the Department's seed-beds at Stockdale, Gippsland. The field was topped to about sixteen leaves during February.

Harvesting was completed in three pickings, which took place on 21st March and 10th and 20th April, 1933. The results are summarized in Table I., yields being shown in pounds of cured, conditioned leaf per acre:—

TABLE I.

Manure, lb. per Acre.	Percentage of Replants.	Final Percentage Survival.	Bright Mahogany.	Mahogany.	Immature Mahogany.	Green.	Scrap.	Total Yield.
	%	%	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.
No manure	3·4	98	580	79	441	320	84	1,504
Super., 560, potash, 150 ..	6·0	99·5	791	111	338	221	68	1,529
Super., 784	4·1	98·4	782	95	205	220	84	1,386
Super., 336	4·1	97·6	822	95	286	232	64	1,499
Super., 560, dried blood, 150..	3·4	98·4	821	89	279	224	72	1,485
Super., 560, dried blood, 150, potash sulphate, 150 ..	5·0	99·6	901	63	374	197	64	1,599
Super., 560	2·0	99·2	876	126	224	170	68	1,464

Variety Trials.

Plants in the variety trials were set out on 15th December. The varieties Warne and Gold-leaf were grown on the Department's seed-beds at Stockdale, and the remaining plants were obtained from a Frankston grower. Although these seedlings were similar to the bulk of seedlings supplied to growers, they did not conform closely to the type they were supposed to represent. It is very difficult to find a uniform run of plants in Victorian tobacco fields. The crops on these plots were picked on the same dates as those on the manurial plots.

Table II. summarizes the results, yields being shown in pounds of cured, conditioned leaf per acre.

The yields over the whole field were remarkably good. The manurial trials averaged approximately 1,500 lb. per acre, and the variety trials just over 1,000 lb. per acre. The site of the variety trials is a comparatively poor piece of ground, being rather cementy and shallow in character, but the field as a whole is a good red, sandy loam, easily irrigable.

From a total yield point of view, the unmanured plots did remarkably well. This is attributed to the previous history of the field, which, before ploughing up in 1931, had been grass land subjected to heavy top-dressing with superphosphate. It had then remained for almost two years under fallow, during which period the couch grass and rubbish had been cleared off it.

On curing and grading the crop, however, the advantages of fertilizing immediately became apparent in the increased yield of bright grades and matured leaf per acre from the fertilized plots.

The grades labelled Immature Mahogany and Green are the doubtful and unsaleable portion of the crop. A big proportion of the immature grade, on further bulking, will become quite good leaf, but the green grade definitely is of very low value. In the unmanured plots these grades represent an unduly high proportion of the crop.

The total yield from the plot fertilized with 7 cwt. of super. per acre definitely is less than that from any other plot. This result was anticipated, but it was thought also that the proportion of brighter and mature grades would have been much greater.

TABLE II.

Variety.	Percentage of Replants.	Percentage Survival.	Bright Mahogany.	Mahogany.	Immature Mahogany.	Green.	Scrap.	Total.
	%	%	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.	Lb. per Acre.
Gold Leaf	4	96	525	60	339	153	53	1,130
White Stemmed Oronoco ..	21	94	270	19	345	285	60	979
Warne	5	86	339	60	258	137	44	838
Conqueror	14	89	346	128	324	181	45	1,024
Hickory Pryor	16	97	450	105	279	192	40	1,066
Dungowan	9	95	333	117	306	275	71	1,102

Definite pronouncements cannot be made from one year's results, but the evidence so far indicates that, on good red, sandy loams in the Shepparton district, 5 cwt. of super. per acre is the most profitable dressing.

The result obtained from the complete manure—that is, 5 cwt. super. and 150 lb. each of dried blood and potassium sulphate—has a particular significance for growers on very light, sandy soil.

There has been no serious loss of colour from using the nitrogen, although the proportion of the immature grade was increased somewhat, while the total yield—1,599 lb. per acre—was the highest obtained.

It is considered that growers on very light soils would be well advised to experiment over a small proportion of their field with a fertilizer dressing of this nature, but the same advice does not apply to growers on rich or heavy soils.

From a study of the results of the variety plots, it will be seen that Gold-leaf, besides giving the greatest total yield per acre, yielded also the greatest proportion of bright leaf. Hickory Pryor and Conqueror are next in that order. Dungowan, one of the most popular varieties in the Goulburn Valley, although giving a high yield per acre, proved very difficult to cure, yielding an unduly high proportion of green and immature leaf. On present information, Gold-leaf, Hickory Pryor, Conqueror, and Warne are varieties recommended for the Goulburn Valley.

In every plot the proportion of green leaf obtained is closely related to the date on which the leaf was picked. Practically all of the green leaf obtained came out of the lot cured on 20th April. Although great care in picking and curing was exercised, for some reason, closely associated probably with climatic conditions obtaining just prior to this date, it was not possible to get a good cure. Growers should endeavour to assure early maturity by planting varieties and using fertilizer dressings that tend towards early maturity.

Table III. shows the percentage of each plot taken at the various pickings.

It will be seen from Table III. that Gold-leaf, Warne, and Hickory Pryor were the earliest maturing varieties among those planted at Shepparton last year, and that manurial dressings of 5 cwt. of super. per acre and of 5 cwt. of super and 150 lb. of dried blood per acre encouraged earliest maturity. The result obtained from the nitrogenous manure, dried blood is in direct contradiction to principles that have been accepted in Victoria for many years, and needs confirmation by further results before being accepted as definitely correct.

Table III.

Treatment.	Percentage Picked on—		
	21st March, 1933.	10th April, 1933.	20th April, 1933.
	%	%	%
No manure	16	31	52
Super., 5 cwt., pot. sulp., 150 lb. per acre ..	23	48	29
Super., 7 cwt. per acre ..	25	43	32
Super., 3 cwt. per acre ..	24	45	30
Super., 5 cwt., dried blood, 150 lb. per acre ..	25	49	25
Super., 5 cwt., dried blood, 150 lb., pot. sulp., 150 lb. per acre	22	47	31
Super., 5 cwt. per acre ..	25	48	26
Varieties.			
Gold Leaf	32	55	13
White Stemmed Oronoco..	18	49	33
Warne	30	58	14
Conqueror	24	49	27
Hickory Pryor	32	46	22
Dungowan	25	43	32

OLD JOURNALS REQUIRED

Owing to the heavy demand for copies, *Journals* for the months of January, February, May, August, October, November, 1931, and January, February, and June, 1932, are out of print. Requests are still being received for copies, in some cases from libraries, where it is desired that complete sets be kept for reference.

If any reader has copies which he will let the Department of Agriculture have, they will be gratefully received. Stamps need not be affixed when any such *Journals* are being sent, as postage will be paid on receipt by the Department.

Codling Moth Control

Experiments at Harcourt

By R. T. M. Pescott, M.Agr.Sc., Entomologist.

THE question of the methods to be adopted for the control of codling moth is of vital importance to the fruit-grower at the present time because of the prohibition of sale of fruit showing appreciable arsenical residue. Health regulations in Great Britain and in other States of the Commonwealth provide that apples must not contain more than 0.01 grains of arsenic per pound of fruit. Where arsenate of lead is used alone in the spray programme this limit frequently is exceeded, and the fruit must then be either hand-wiped or washed with a chemical solution. Experiments conducted at Harcourt indicate that, if white oil emulsion sprays are incorporated in the spray programme, a more efficient control of the codling moth is obtained and, at the same time, the arsenical residue is reduced below the limit prescribed by law. It would appear, therefore, that, in districts similar to Harcourt, growers should incorporate in their spray programmes white oil emulsion sprays after the initial arsenate of lead calyx sprays.

Ready to Spray—a little early on the left, a little late on the right.

The codling moth (*Cydia pomonella* L.) has been a major pest of apples in Victoria for many years, particularly in the northern districts.

Experiments to determine a spray programme which would successfully keep the codling moth in check were commenced in the 1926-27 season on the property of Mr. Thomas Code, Harcourt. In the early experiments the only spray material used was arsenate of lead, which was then generally recommended by overseas authorities for codling moth control. Later, the experimental block was enlarged to include in the spray programme white oil emulsion sprays, which had been successfully used in other countries. This work has been continued up to the present year, in which combinations of arsenate of lead and white oils have been used, as set out below:—

Spray Experiments.

The object of the experiments with the various sprays in the codling moth work at Harcourt has been directed with a view to endeavouring to find a spray programme which will be more effective than the one at present in general use among orchardists, and yet which will be economically sound, and also to attempt to reduce to a minimum the amount of arsenic left on the fruit at picking time without sacrificing any degree of control of the moth.

A block of apple trees of mixed varieties and in full bearing was used for the experiments. The varieties of apples included those most grown for the present-day market,

viz., Rymer, Jonathan, Cleopatra, Sturmer, Stone Pippin, Dunn, and several other varieties not now grown commercially. Each section of spray treatment contained eighteen trees, and the following spray programmes were used:—

TABLE 1.—SPRAY PROGRAMME.

Spray Number.	Material.	Dates of Application.
	Block A.	
1 to 5	Arsenate of lead, 5 lb. of paste to 80 gallons of water ..	27.10.32, 7.11.32, 12.12.32, 9.1.33, and 7.2.33
	Block B.	
1 and 2	Arsenate of lead, 5 lb. of paste to 80 gallons of water ..	27.10.32 and 7.11.32
3	Dutox*, 1 in 30	13.12.32
4	Arsenate of lead, 5 lb. paste to 80 gallons of water ..	2.1.33
5	White oil emulsion, 1 in 60	7.2.33
	Block C.	
1 and 2	Arsenate of lead, 5 lb. paste to 80 gallons of water ..	27.10.32 and 7.11.32
3	White oil emulsion, 1 in 60	12.12.32
4	Arsenate of lead, 5 lb. paste to 80 gallons of water ..	9.1.33
5	White oil emulsion, 1 in 60	7.2.33
	Block D.	
1 and 2	Arsenate of lead, 5 lb. paste to 80 gallons of water ..	27.10.32 and 7.11.32
3, 4, and 5	White oil emulsion, 1 in 60	12.12.32, 9.1.33, and 7.2.33
	Block E.	
1 to 5	Arsenate of lead, 2½ lb. paste to 80 gallons of water; white oil emulsion, ¾ gallon to 80 gallons of water	27.10.32, 7.11.32, 12.12.32, 9.1.33, and 7.2.33

* *Dutox.*—Dutox is a trade product, consisting essentially of the poison *Barium fluosilicate*. It was hoped that this material would prove of sufficient value to warrant its use instead of arsenate of lead, and thereby overcome the arsenic residue problem. However, it was soon found that it was of little value, and, in order to save the remainder of the fruit on the experimental block, it was necessary to apply oil and arsenic sprays.

In the above programmes, all the sprays were applied with an ordinary motor spray pump with spray gun attached, at a pressure of about 250 lb. per square inch. The first or calyx spray was applied when the petals were fallen from the majority of the blossoms (about 80 per cent.), and the second spray was applied eleven days later. The second spray is used to control those grubs missed with the first spray. The times of applying the remaining sprays were determined mainly by the use of lures placed in the trees.

In computing the results, all percentages were determined from the actual count of all apples on each tree of each experimental block. All windfalls were carefully examined, and the number of these affected with the codling moth larvae ascertained. No distinction was made in tabulating the results between apples showing one, two, or more entrances, nor between fruit with entrances and stings, providing the latter caused a blemish rendering the fruit unfit for export. The actual counting of the apples in all cases was performed by the writer.

A rough preliminary estimate was made on 4th January to discover the percentage of infection at that period. By means of records obtained from the bandages of the trees at that time, it was found that the insects hibernating there were in the larval and pupal stage, so that any infection prior to that period would be the result of the first brood of moths.

Table II. sets out the complete results of the spraying experiments for the season just completed:—

TABLE II.

Block.	Material.	Percentage Codling Moth on 4th January, 1933.	Percentage Codling Moth at Picking.
		%	%
A	Arsenate of lead alone	4·50	7·29
B	Arsenate of lead followed by "Dutox"	12·50	16·73
C	Arsenate of lead and white oil alternately, less than	1	4·25
D	Arsenate of lead followed by white oil (1 in 60)	less than 1	4·26
E	Arsenate of lead and oil in combination	3·50	6·34

Codling Moths (five times actual size).

The results set out in Table II. on examination show several interesting facts—

(*a*) That the spray programme D, in which arsenate of lead was followed by white oil emulsion spray, gave a better control of the codling moth than did spray programme A, in which arsenate of lead was used alone. This confirms the results of other years.

(*b*) That the spray programme C, in which arsenate of lead and white oil emulsion are used alternately, gave the same measure of control as spray programme D, in which arsenate of lead was followed by white oil emulsion. This bears out the results of the experiments for the years 1929-30.

(*c*) That the spray programme E, in which arsenate of lead and white oil are used in combination, whilst proving better than spray programme A, in which arsenate of lead is used alone, is not as efficient as spray programmes C and D, in which arsenate of lead and white oil emulsions are used alternately, but not in combination.

(*d*) That the trade product Dutox, which is a barium fluosilicate, is not efficient as a substitute for arsenate of lead in codling moth control.

Spraying Costs.

The efficiency of the above spray programmes must not be gauged solely on the percentage of clean fruit at picking time, but also as to whether the extra fruit obtained by a new spray programme more than balances the extra cost due to the materials in that programme. In this connexion, a comparison will be made between spray programmes A, C, D, and E.

As a basis for estimate, it is a well-recognized fact that one barrel of spray (80 gallons) is sufficient to spray 100 cases of fruit. The cost of arsenate of lead is reckoned at 8d. per lb. and white oil at 5s. 6d. per gallon. The value of the apples is estimated at 5s. per case. Details of costs and returns are shown in Table III.

Codling Moth larva and pupa within cocoons from beneath bark of apple tree.

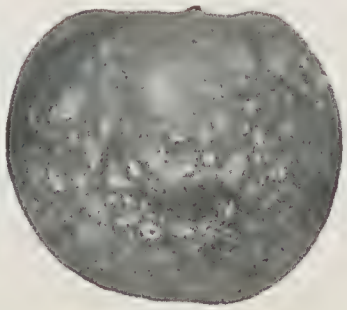
Table III.

Spray Programme.	Arsenate Sprays.	Oil Sprays.	Total Cost.	Extra Cost over Programme A.	Extra Marketable Fruit over A.	Value of Fruit.	Overall Profit.
	s. d. s. d.	s. d. s. d.	s. d.	s. d.		s. d.	s. d.
A	5 at 3 4 = 16 8 ..	.. .. ..	16 8	..	..	..	..
C	3 at 3 4 = 10 0 ..	2 at 7 4 = 14 8 ..	24 8	8 0	3 cases	15 0	+ 7 0
D	2 at 3 4 = 6 8 ..	3 at 7 4 = 22 0 ..	28 8	12 0	3 cases	15 0	+ 3 0
E	5 at 1 8 = 8 4 ..	5 at 4 2 = 20 10 ..	29 2	12 6	1 case	5 0	− 7 6

From these figures, it will be seen that spray programmes C and D were economically sound, while the spray programme E, when all costs were considered, resulted in a loss. The greatest overall profit was obtained from programme C, where the arsenate of lead and white oil emulsions were used alternately. Incidentally, programmes C and D have an added advantage over programme A, in that they are ovicides and scalicides—i.e., they will destroy the eggs of Red Spider and Bryobia mite, and also San Jose Scale and Apple Mussel Scales—thus obviating the necessity for extra sprays to control these pests.

Arsenical Residues.

Owing to the possible danger to human life through arsenic remaining on apples at picking time, a limit has been placed on the amount allowable on fruit. This has been fixed, by law, at 0·01 grains of arsenic per lb. of fruit, the arsenic to be estimated as arsenic trioxide (As_2O_3).



Apple showing residue of arsenic.

Representative samples of apples from each of the experimental blocks were submitted to the Agricultural Research Chemist for determination of the amount of arsenic adhering to the fruit, with the results shown in Table IV.:—

Table IV.

Spray Programme.	Arsenic as As_2O_3 in grains per lb. of Fruit.
A	0.039
B	0.029
C	0.008
D	0.006
E	0.031

An analysis of these figures shows that only two of the spray programmes, viz., C and D—where the white oil was used with the arsenate of lead in the programmes, but not in combination—conform to the limits required by law. This fact is of the greatest importance at the present juncture on account of the attitude of the Queensland authorities with reference to the presence of arsenic on Victorian apples. From Tables III. and IV. it can be seen that there is available to the grower, in programmes C and D, methods of spraying by means of which the percentage of codling moth infested apples at picking time may be reduced to a minimum, and yet the arsenic residue on the fruit will conform to the limit prescribed by law.

Lure Experiments.

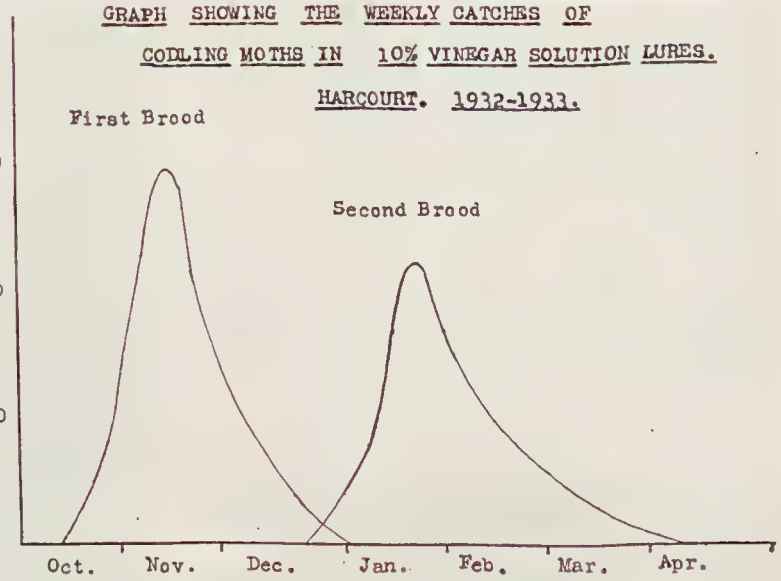
The study of lures was undertaken with a twofold purpose in view, viz.:—

(*a*) The use of lures in the orchard to determine accurately the times at which to apply the sprays in the various programmes.

(*b*) The use of lures as a means of trapping the adult codling moths in the trees, with a view to reducing the moth population in the orchard.

With regard to (*a*), it is thought that many orchardists fail to apply their sprays at the time when the maximum results would be obtained from these sprays. A study of the life history of the codling moth under their own orchard conditions would enable them to determine the most suitable time, and the use of lures is recommended for this purpose. Lures consist, for the most part, of suitable glass or pottery jars (about 1-pint size), containing an attractant fluid. These are hung in the trees in the orchard. The adult codling moths are attracted to these lures, and the actual numbers can be counted every morning, when an accurate guide to spraying will be obtained. At Harcourt, 10 per cent. vinegar solution was used in the lures for the life-history studies as an aid to spraying, and the numbers of codling moths caught in these traps were counted every week. The accompanying graph was composed as a result of experiments at Harcourt for the season 1932-33, and summarizes the results obtained over the period mid-October to the first week in April of the following year.

From this graph it will be seen that there were two complete broods of the codling moth at Harcourt during the past season, the maximum intensity of the first being approximately November 12th and for the second January 18th, 1933.



(*b*) For the experiments to ascertain the most suitable lures for trapping the adult moths, five different materials were used under as nearly as possible identical conditions:—

(1) Fermented apple juice.

(2) Fermented apple juice plus Geraniol.

(3) Vinegar solution, 10 per cent.

(4) Vinegar solution, 10 per cent., and Geraniol.

(5) "Luremin"—a proprietary compound.

TABLE V.

Week Ending—	Numbers of Moths per week in Lure Mixture.				
	1.	2.	3.	4.	5.
October 8 ..	..	..	..	..	..
,, 15 ..	2	..	1	..	..
,, 22 ..	6	2	5	2	..
,, 29 ..	7	3	12	7	1
November 5 ..	14	8	23	14	1
,, 12 ..	18	14	29	17	4
,, 19 ..	12	10	20	12	7
,, 26 ..	9	5	12	4	4
December 3 ..	8	3	8	2	2
,, 10 ..	7	2	6	1	1
,, 17 ..	2	1	4	..	..
,, 24 ..	1	..	2	..	..
,, 31 ..	..	..	4	..	..
January 7 ..	3	1	8	2	..
,, 14 ..	9	6	17	4	..
,, 21 ..	12	11	22	5	..
,, 28 ..	10	8	17	6	..
February 4 ..	8	6	12	7	..
,, 11 ..	7	2	10	9	1
,, 18 ..	2	5	8	12	7
,, 25 ..	5	9	6	2	9
March 4 ..	2	3	4	..	2
,, 11 ..	1	4	3	..	1
,, 18 ..	..	2	1	..	..
,, 25 ..	..	1	1	..	..
April 1 ..	..	..	..	3	..
,, 8 ..	..	..	..	1	..
,, 15 ..	3	..	..	..	..
,, 22 ..	..	1	..	..	..
,, 29 ..	..	..	..	..	..
Totals ..	148	107	235	110	40

Ten bottles of each of materials 1 to 4 were used, and twenty bottles of No. 5. Table V. summarizes the results obtained by the use of the different materials for the various weeks over which the experiment was conducted.

A study of these figures reveals that the 10 per cent. vinegar solution resulted in the capture of the most moths, with the fermented apple juice section the next best. This confirms the results of previous years' experiments. The addition of a small quantity of Geraniol to both the above lures considerably reduced the number of moths caught. This is contrary to the results obtained overseas, where the addition of small quantities of Geraniol has been beneficial. The "Luremin" lure was a decided failure as a lure for codling moth, and it is thought that no further tests should be carried out with this material.

An examination of the moths caught in the vinegar solution lure showed that 72 per cent. were females, and that all of these female moths possessed eggs in varying numbers.

Bandage Experiments.

Hessian bandages around the trunks of apple trees to capture the larvae of the codling moth have been used extensively by orchardists for a considerable period. This material has several good points, but suffers from the drawback that the bandages must be examined thoroughly at least every fortnight, and the larvae present destroyed. If this is not done, the bandages serve as ideal breeding grounds for the pest. To overcome this difficulty

recent experiments in the United States have shown the value of chemically treated corrugated cardboard bandages, and these types of bandages, which are available on the local market, were used at Harcourt for the first time in the past season. The object of these bandages is to endeavour to destroy the larvae which enter the bandage without having to remove the bandage. The chemical used in the preparation of the bandage is betanaphthol, which is dissolved in engine oil, after which the whole bandage is soaked in the mixture and allowed to dry.

In the experimental block, adjacent trees were bandaged with the ordinary hessian bandages, and with the chemical bandages respectively. The counts of the actual larvae trapped in these bandages are as follow:—

Hessian bandages (20 bandages): 726 (23 dead, mostly with fungal disease).

Chemically treated bandages (10 bandages): 287 (all dead).

These figures show that while the actual number of larvae caught per bandage was slightly lower in the case of the chemically treated bandage than with the hessian bandage, the chemical bandages had the great advantage in that every larva was destroyed. It is felt that chemically treated bandages will prove of very great value to orchardists in codling moth control.

Section af treated corrugated paper band showing captured larvae.

Summary.

The results of the codling moth experiments at Harcourt this season again confirm the results obtained in previous years, namely that the use of white oil emulsion in the spray programmes after the two calyx arsenate of lead sprays have been applied, results in a more efficient and economical control of the codling moth than where arsenate of lead is used alone in the spray programme. Moreover, those programmes in which oil emulsions were used resulted in an arsenical residue, which was below the limit prescribed by law. This was not the case where arsenate of lead was used alone.

The experiments this year have borne out the previous results that lures composed of vinegar solution have proved more effective in trapping the codling moth than other recognized lures.

The use of chemically treated bandages this season has resulted in a large number of larvae being captured, and, more important, these were all destroyed by the chemical used.

Burnley Egg-laying Competition

In the Burnley Egg-laying Competition winter test, first prize in the heavy breeds section was won by the team of Australorps entered by Mr. R. G. Wilkins, not Mr. R. G. Wilson as shown in the September issue.

The Cultivation of Herbs

By A. W. Jessep, M.Agr.Sc., B.Sc., Dip.Ed.

CULINARY or sweet herbs include those plants whose tender roots, green parts, or ripe seeds have an aromatic flavour and fragrance due to the presence of a volatile oil. These herbs are called "sweet," because of their fragrance, and "culinary" because they are used for the flavouring of various kitchen dishes.

One cannot overrate the importance of herbs and of seasoning in the preparation of foodstuffs, and the housewife will find that fresh herbs from the back garden are infinitely superior to those obtained in packets from the grocer. Despite this fact, the cultivation of herbs does not always receive the attention it deserves. Though usually the housewife requires only very little at a time, she cannot obtain the desired flavour from any other material. Every kitchen garden, therefore, should include a patch of herbs. These may be arranged as a border to the vegetable beds, so that they serve also to keep the plots tidy and prevent the water from washing away the edges of the beds.

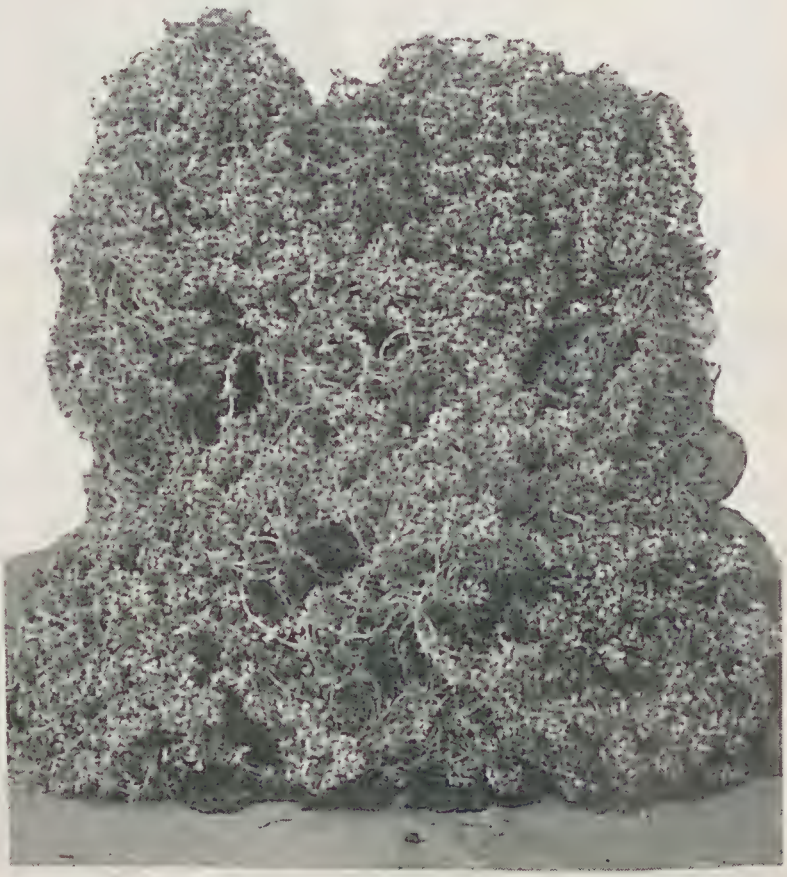


Fig. 1—A single plant of Thyme.

In addition to their cultivation for home use, herbs may be grown also on a commercial scale. That a satisfactory local market exists is demonstrated by the fact that some 200,000 lb., valued at from £5,000 to £6,000, is imported annually. As Victoria's climate is suitable for the production of herbs, and the labour requirements are not excessive, these importations should not be necessary. At present there is a duty of 4d. per lb. on herbs imported from the United Kingdom, and 5d. per lb. on those imported from foreign countries. If it is intended to grow herbs on a commercial scale, however, the grower should ascertain beforehand the probable demand for them from sources such as wholesale butchers and other merchants.

The majority of culinary herbs are natives of lands bordering the Mediterranean and, as is to be expected, need a good sunny position to enable them to make their maximum growth. Soil conditions are important. Such culinary herbs as parsley, sage, mint, marjoram, thyme, and tarragon, the kinds mostly grown on a commercial scale, do best on a medium loam that is friable and well drained.

Thyme (*Thymus*).

Given an open position and a rich, well-drained, loamy soil, the growing of thyme presents no difficulties. With this, as with other herbs, however, the soil must be well worked in order to eliminate all weeds and foreign plants, as it is essential, when producing for the market, that the sample be free from weeds.

The varieties most extensively grown are the broad-leaved thyme and the lemon-scented thyme. Although they may be grown from seed, it is advisable to plant cuttings or rooted portions which give a more uniform stand and a quicker return. A crop planted out with rooted cuttings will give a high yield in the first season. When propagating by seed, plant in drills either by hand or with a small seed drill of the Planet Junior type, care being taken not to sow more than ½ inch deep, and in drills about 18 to 24 inches apart. This method will take about 6 to 8 lb. of seed per acre.

When about 1 or 2 inches above the ground the plants should be thinned out until individual plants are about 6 inches apart. When grown from rooted divisions, plant the same distance apart. This method of planting may be carried out most successfully about August or September. If the plant is being grown on an extensive scale, the rows should be far enough apart to enable a one-horse cultivator to be used, thus avoiding a great deal of hand hoeing. It is essential that weeds be kept down, as in addition to absorbing soil moisture and plant food, they may be cut when the herbs are being harvested and, as stated above, spoil the sample which must be free from impurities. Every three or four years the plants should be lifted and replanted.

Thyme is a perennial and may be harvested at any period of the year.

Harvesting.

If the herbs are to be sold in the green state, they should be cut and tied in bundles suitable to the demand they are to supply. If marketed in the dry state, there are two points which must be kept in mind; firstly, to ensure that the herb retains as much of its flavouring properties as possible, and, secondly, that its green appearance is preserved. To preserve the green colour the plants should be cut just as they are coming into flower. To retain the essential oils they cannot be flue cured or sun dried, but must be cut in dry weather, with a sickle or mower, preferably in the morning, and carted immediately to a drying-room, which should be spacious and well ventilated. The herbs should then be placed in layers of not more than one foot thick on a clean floor, on tarpaulins, or on benches with an opening covered with fine-mesh wire-netting running along the centre for better aeration. They should be turned daily until thoroughly dry, when the leaves are threshed from the stalk, and the whole thoroughly sifted so that only the leaves — which alone contain the flavouring oils—are obtained in the final sample. The leaves are then placed in air-tight vessels or bags so as to prevent deterioration by evaporation. Many imported herbs contain the stems broken up finely, but they are included only as filling and do not contain any aromatic flavours. It is of great importance to supply a good clean sample.

Fig. 2.—Methods of Propagating Thyme.

(A) Root division. (B) Rooted cutting. (C) Cutting, before rooting.

Sage (*Salvia officinalis*).

Salvia, the genetical name of sage, means health, and the ancient Arabs had a saying, "How can a man die who has sage in his garden?"

Although a perennial, sage is not so hardy as thyme, but, under normal conditions, is easily grown in Victoria. Questions of drainage and shelter from the prevailing winds are more important than the quality of the soil, but a medium loam is very suitable. Propagation is carried out by cuttings, root division, layering, or from seed. If grown from seed, it may be sown in the position it is intended that it should permanently occupy, in the month of October, and later the plants may be thinned out as found necessary.

Fig. 3.—Methods of Propagating Sage.
(A) Root division. (B) Rooted cutting. (C) Cutting ready for the nursery.

However, a better plan is to sow the seed in August, about ½ inch deep, in a protected seed-bed, and thin out the seedlings as they grow to ensure getting vigorous plants. Transplant about the middle of October in rows about 2 feet apart with 1 foot between the plants. Every three or four years the plants should be divided up and reset as they commence to lose their vitality after about four years. Arrange the work so that a quarter of the area is so treated every year.

Fig. 4.—A plant of Sage.

During the first year cut only once, and then not too drastically, but after that the plants may be cut three times a year just as they commence flowering. They are then dried in the manner described for thyme.

Being a strongly flavoured plant, sage is used for such fat meats as pork, goose, and duck, and in the manufacture of sausages. Thyme and sage are both used very extensively in the dry state. Mammoth, an improved variety, is the one most commonly grown.

Mint.

Mint is another of the Labiates, botanically known as *Mentha,* and although there is a large number of species, only three are used to any extent as culinary herbs. *Mentha citrata, syn. odorata,* is the citron-scented mint. It has reddish purple flowers in round terminal heads, and although once popular is now seldom grown. On the other hand, the cultivation of *Mentha piperita,* the peppermint, and *M. viridis,* the spearmint, has increased greatly in recent years. Both these plants yield an essential oil which is their principal marketable product, although the dried leaf of peppermint is used to a small extent, while peppermint and spearmint both are used sparingly for culinary purposes. Peppermint oil is the more important, and is used in numerous medicinal products, but even more so for flavouring confectionery, chewing gum, and liqueurs. The use of spearmint oil on the other hand is practically confined to the chewing-gum trade.

Peppermint (*Mentha piperita*) occurs in two important forms known as the black mint and the white mint. The black mint, which may be distinguished by its purple stems and deep-green leaves, larger than those of the white mint, is more hardy, but the white mint, which has green stems and light-green leaves, produces a finer oil.

Fig. 5.—Spearmint (Mentha viridis).

Spearmint, although somewhat similar to peppermint, can be easily distinguished by its longer and lighter-green coloured leaves, the more pointed flower spikes, and by the difference in the odour of the oils.

Mint is a perennial plant with square stems and profuse flowers. It does not set its seed well, but as it sends out abundant runners, propagation usually is carried out by planting the runners which root and commence growth quickly.

Mint prefers deep, rich soil, well drained, but retentive of moisture, so that river flats are specially suitable. However, it grows satisfactorily in almost all soils, except heavy clays, so long as they are well drained and kept moist. The ground must be thoroughly worked to destroy as many weeds as possible, for once the plants are well established inter-cultivation with horse-drawn implements is impossible. A good position, open, but sheltered from the prevailing winds, gives the best results.

As there are several varieties of mint, it is essential that the grower obtain the correct

Fig. 6.—Showing the Propagation of Mint by runners.

ones, and care must be taken to ensure that the true plant is obtained. Where possible, it is advisable to purchase the runners from an actual grower of the variety of mint required. The runners are planted usually in one of two ways. In the first, the land having been properly prepared, furrows about 4 inches deep and 3 feet apart are made with a furrowing implement. The runners are placed almost end to end in the furrows, and covered with soil which is packed by walking in the furrow. If planted in this manner, inter-cultivation

may take place during the first year or so. Sufficient runners to fill about twenty bran bags will be required to plant 1 acre.

The second method is to have lands 6 to 8 feet wide with strips of about 18 inches wide between them. These strips are an advantage when weeding, as the weeds may then be thrown on to this area and easily collected. The plants may be dibbled in about 12 inches apart. With this system about 40,000 plants are required for an acre.

Cultivation.

Weeds, which are detrimental to the flavour and colour of the oil must be kept down, and although this may be carried out partly by horse implements, a good deal also must be done by hand.

After the final harvesting operations, the field should be run over with a spring-tooth cultivator, and a dressing of market garden manure added at the rate of 2 cwt. per acre. The field also should be harrowed or spring-toothed early in the spring, as this tends to thin out overcrowded mint and destroy weeds. Usually two crops per year will be obtained. During the winter the mint is ploughed over so as to cover the runners, and then later top-dressed with market garden manure and spring-toothed. The stand, after three or four years, usually becomes very badly infested with weeds, and it is then advisable to plough it up and re-plant.

Harvesting.

The oil occurs in numerous minute glands on the under surface of the leaves, and consequently the amount of oil obtained is dependent upon the leaf surface, and therefore upon the bushy habit of the plant. It is essential, therefore, that harvesting operations be carried out with a minimum loss of leaves. The crop is harvested with a scythe or sickle or by a harvesting machine adapted to cut the herb with a minimum amount of wastage.

Both spearmint and peppermint contain the maximum amount of oil when they are commencing to flower, and in most instances harvesting operations should commence at that stage. The crop is cut, and the following day is raked into wind rows and cocked. The next day it should be ready for "stilling," and should be sufficiently cured to enable it to be stored for some days if the distillery is not ready to receive it.

Distilling.

The cost of putting down a distilling plant is considerable, and where possible a community still might serve the purpose as each stilling can easily be kept separate, and a sum mutually agreed upon by the joint owners charged for this work. The mint being bulky, a comparatively large still is required to deal with between 15 cwt. and a ton at a time.

The process employed for removing the oil from mint is very simple. It consists of passing a current of steam through the herb. By this means the oil is vaporized and the steam and oil vapours are conducted through a worm, or other form of condenser, where they are condensed to water and oil. The water and oil are collected in suitable containers in which they separate into layers, the oil floating on the surface of the water. Although the equipment used for this purpose has been greatly improved, the method of operation has, on the whole, remained unchanged.

A very satisfactory type of still is one constructed with a false bottom. Water is poured into the empty still until it rises about one-third into the charge chamber. The mint is then packed firmly into it until it is level with the top of the still. The still head is then let down by pulleys and clamped into a water seal joint. The distillation is carried out by boiling the water beneath the charge chamber by means of steam under pressure being conducted in a coil from a boiler, the top of which is well below the false bottom.

The application of direct heat to the still is liable to cause burning, and for this reason is not favoured. The distillation commences in about three-quarters of an hour from the time the heat is applied, and is complete in about six hours. The oil being insoluble in water remains on top, and is collected by running off the water, and leaving the oil which is collected and kept in earthenware jars. The water is then put back into the still in case any oil escaped with it. The spent mint may be used on the soil as organic manure.

Yield.

The yield varies according to the season, and whether or not two crops are harvested in a year. The average weight of mint obtained usually is between 3 and 4 tons per acre, and 10 to 12 lb. of oil per ton is obtained. The average yield of oil per acre, therefore, is about 30 to 40 lb. The oil usually is disposed of

at once to the merchants, by whom it is mellowed in storage before being passed on to the consumer. The oil is extremely sensitive to light, and consequently must be stored in complete darkness, preferably below ground in concrete chambers.

Tarragon (*Artemisia dracunculus*).

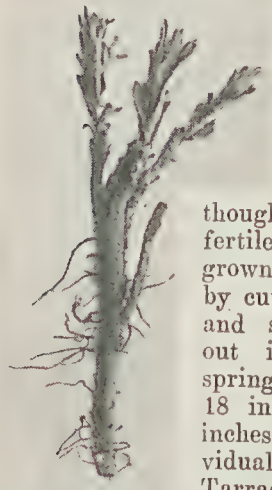


Fig. 7.—A rooted portion of Tarragon ready for planting.

Tarragon is a perennial, and one of the most useful of the culinary herbs. It does well in a medium soil, and prefers a warm, rather dry, situation. Although it does not produce fertile seeds, it can be grown easily by divisions or by cuttings, as with thyme and sage. It is planted out in winter or early spring in rows about 12 to 18 inches apart, with 12 inches between the individual plants in the row. Tarragon is cultivated in a way similar to that described for thyme and sage. It is used in the green state or may be dried for future use. The aromatic leaves are used for seasonings, salads, and in the preparation of tarragon vinegar. This herb may also be distilled for its oil similarly to the mints.

Marjoram (*Origanum marjorana*).

The botanical name for Marjoram (*Origanum*) means "Joy of the Mountains," an appropriate name for this very useful perennial herb. The types of soil and method of cultivation necessary are similar to those for herbs in general.

Although easily produced from root division or cuttings, it can be grown also from seed which is planted in a seed-bed, and later transplanted into rows 18 to 24 inches apart, with 12 to 14 inches between the plants.

It is used either in the green state or may be cut when beginning to flower and dried for future use. Its flavouring properties for soups, sausages, and for general culinary purposes are well known.

Parsley (*Carum petroselinum*).

Unlike the herbs previously mentioned, parsley is a biennial and not a perennial plant, and therefore has to be replanted every year to ensure a continuous cutting.

A good, deep medium loam that has been thoroughly cultivated, and to which liberal farmyard manure has been added gives very satisfactory results, but unlike most other herbs parsley prefers a shaded position.

For continuity of supply, it is preferable to make two sowings annually, the first in March and April for winter and spring, and the second in August and September for summer and autumn crops. As parsley seed is slow to germinate, it is advisable when sowing in the position it is intended that it should permanently occupy, to make the rows sufficiently wide apart to allow free use of the hoe during the germination period. If sown as above make shallow drills 12 to 18 inches apart, and cover with not more than ½ inch of fine sand or soil. When the plants are well above ground, thin out to 9 inches apart and replant the thinned-out plants. If sown in a seed-bed transplant the seedlings in rows 15 to 18 inches apart with 9 to 12 inches between the plants. As they have a tap root, transplanting must be carried out carefully.

Work the soil thoroughly between the rows to keep the weeds down, and water well during the summer months.

Under good growing conditions the parsley should be ready to pick in from twelve to fourteen weeks after sowing the seed. Remove flower stalks when they appear, otherwise the plant will die down as soon as the seed ripens. With the flower stalks removed, the plants will continue to produce for a much longer period. As parsley is used only in the fresh state the cutting must be carried out as it is required for use to ensure a continuous supply throughout the year, and care must be taken that the plants are not cut back too severely.

Although the market for parsley is rather limited, it is used fairly extensively for ornamental purposes such as garnishing dishes for cold lunches, for flavouring, and for making parsley sauces.

The best varieties to grow are Triple Curled, Extra Dark Moss Curled, and Dwarf Perfection. Of these the Extra Dark Moss Curled is probably the best under average conditions.

Lavender (*Lavendula*).

Apart from the culinary herbs, there are others grown for the volatile oils they produce, and which are used in the manufacture of cosmetics, perfumes, &c. Among these is lavender, the name of which is derived from Lava, meaning to wash, and alludes to its use in the preparation of lavender water. Lavender has been grown commercially in England for 300 years, and the English oil of lavender has become world famous as a product unequalled by that of any other country. However, there does not appear to be any reason why an oil just as good should not be produced in Australia.

The situation and soil are extremely important, and must be carefully considered before attempting to grow lavender on a commercial basis. The soil should be a light or sandy loam with a calcareous or gravelly subsoil. If this latter quality is absent from the soil a dressing of lime should be applied every three or four years. Good drainage is most essential, and a heavy soil retentive of moisture is altogether unsuitable, as in it the lavender would soon die of root-rot. The situation should be an open sunny one, as the home of the plant is on the hot dry hillsides of the Mediterranean. At the same time the situation should be one sheltered from the prevailing summer winds to avoid injury to the flower spikes. It has been found that the best commercial essential oil has been obtained from *Lavendula vera,* when grown in a more temperate region to that of its native habitat.

Fig. 8.—A plant of Lavender.

Being a perennial plant a very thorough and deep cultivation is necessary, and it is a good plan to grow a fallow crop such as potatoes or mangolds before establishing a crop of lavender. The land must be thoroughly cultivated after planting to secure satisfactory flowering, and in order that this may be done, the rows should be far enough apart to enable horse cultivation.

Lavender may be propagated from seed, but as plants raised from seed vary within certain limits, the stand may not be so regular as that grown from root division or cuttings, and, furthermore, would not produce nearly so much flower during the first year or two as it would were vegetative methods of propagation used.

When propagating by cuttings, these should be made of young wood about 4 or 5 inches long, about three-quarters of their length being inserted in free sandy soil during the autumn. These will be ready for planting out in the following spring.

In propagation by root division, the plants are divided up so that each portion has some fibrous roots attached, and these are planted out in the late winter. Only a small portion is required, and a mature plant will give a large number of rooted plants. If the seed is used, sow in February, and transplant early in the spring into rows about 2 ft. 6 in. apart, with 12 to 18 inches between the plants. After the first year, every second plant may be removed and transplanted elsewhere. The seedlings will vary, and the plants that are removed could replace the less desirable types. However, it is better to start with a small area, and propagate from the best plants, working up a stock of high standard plants rather than to try to work up in the one year a large area from seed.

The rooted cuttings or root division plants should be planted out about 2 ft. 6 in. square, so as to allow of cross cultivation with the horse hoe. It has been observed that the quality of the perfume seems to increase with the depth of colour of the calyx of the flower, so that it is advisable to select this type for propagating.

The variety used in commerce is *Lavendula vera,* and it is important that this variety be obtained. Care must be taken to avoid unsuitable varieties, such as *Lavendula spica,* or spike lavender, which is very robust, but produces a poor type of oil. *Lavendula vera* has been improved for oil content by selection, and the form grown in the trade is known as *Lavendula vera var. officinalis,* and is very satisfactory.

During growth the weeds must be kept down both to conserve soil moisture and nutriment, and to obviate interference with harvesting operations.

After about six or seven years the plants, which have then passed their prime, should be taken out, and the ground given a year's rest. This operation should be so spread over the area that each year a portion of the plants are taken out and planted back in the fallowed land of the previous year.

Fig. 9—Propagation of Lavender.

Left, root division; centre, rooted cutting ready for planting out; right, cutting prepared for the nursery.

Marketing.

The crop may be marketed in three ways. There is a steady demand for lavender in the green state, and it is cut when in bloom, and sold in small bundles as cut flowers. Secondly, there is a much larger demand for the dried lavender flowers. The flowers are cut with a sickle or scythe when half the spikes are in full bloom, and carted into drying racks which usually are made with fine gauge wire, and situated in an airy room. The racks should be of a convenient width, about 6 feet wide and 6 feet between the layers. When dry, the flowers are rubbed off the stems either by hand or by some mechanical means, such as a flail and then sieved to remove the stems. The dry lavender flowers are then utilized for filling innumerable types of articles. If they are squeezed occasionally the oil glands are broken, and the perfume lasts for two or three years.

Thirdly, the crop may be distilled. This is a more technical operation, and must be carried out carefully as the oil may easily be ruined. The still should be made of copper, and lined with tin, care being taken that no galvanized iron comes in contact with the flowers or oil. The still is steam heated as in the distillation of culinary herbs.

The flowers are cut when in full bloom, which is about five or six days later than when marketed in the green state. The cutting takes place in the daytime when the plants are dry, and these are carted to the still in the fresh condition, and treated as described above for mints. Usually the remnants of the dried lavender are put through the still, and the oil extracted from them also.

The yield of oil varies considerably according to the environmental conditions of soil and climate, and with the age of the bushes, which, after five or six years, commence to deteriorate. The quality, as well as the quantity, of the oil varies. However, generally speaking, 1 cwt. of fresh flowers will yield about 8 oz. of oil, and on an average an acre of lavender should produce about 12 lb. of lavender oil. After distillation the oil is collected, and, until sold, is stored in earthenware or blue jars in the dark.

[*Continued on page 530.*

Rearing Chickens

BY W. C. RUGG.

BY the end of September or early in October the hatching of chickens intended for egg production should be finished. Experienced poultry farmers need no advice as to the correct time to hatch. They know the losses that occur through late-hatched chickens. But there are many people who have recently taken up poultry-farming who are not aware that, with late-hatched chickens, there is a very great risk of high mortality in rearing. As a rule, late-hatched chickens that do live are slow to develop and usually are more susceptible to sickness. This further retards their growth and tends to degeneracy, particularly if they are used for breeding purposes in future years.

Many beginners make plans early in the season to hatch a certain number of chickens. Their objective is to have as many pullets as possible to put into their laying-sheds for the coming winter. It often happens that eggs placed in the machines early in the season prove to be infertile, or, for one or several reasons, the percentage of chickens is low. When the end of September arrives and the number hatched falls short of the estimate, there is a temptation to take chances and continue hatching late in the year. This temptation should be resisted at all costs, because, in nearly all cases, in addition to being unprofitable themselves, these late-hatched chicks are a menace to the rest of the flock, since the low vitality of many of them makes them more liable to disease. Profits from poultry depend on the quality of the pullets reared rather than the numbers. To have pullets of good quality it is necessary not only that they be hatched from eggs laid by hens with strong, vigorous constitutions, but also that these eggs should be hatched during the months of July, August, and September. In the cooler districts of the State the season could start in the middle of July and finish during the second week in October; but experience and observations over many years and on many farms have convinced the writer that the majority of chickens hatched after that date are unprofitable as egg producers.

The average Leghorn chicken, when hatched, weighs less than 1½ ounces, but, if it is well fed and brooded under proper conditions, it will double its weight in two weeks. At a month old it should be about four times the weight it was when hatched and by the time it is three months old it will weigh approximately 2¼ lb., or 26 times its weight when hatched. To obtain such rapid growth and have the chicken in good health calls for care in providing the correct environment and a sound method of feeding.

Chickens, whether in the brooding stage or after they can do without artificial heat, must not be exposed to too much heat or too much cold, as either is liable to cause digestive troubles, which may be followed by diarrhœa,

resulting in lowered vitality and greater liability to disease. It is seldom that chickens reared by natural means (that is, with a hen) suffer from diarrhoea or any digestive trouble, despite the fact that, from the time they are a few days old, they eat anything the hen eats, including whole grain. The only apparent explanation is that they have ideal brooding conditions, i.e., the proper degree of warmth when and as often as they require it.

The foods supplied to the young chickens should contain carbohydrates and fat, the function of which is to supply energy and heat. For the growth of muscle and tissues, material containing proteins must be given, and for bone-building, material in the form of mineral must be supplied. The logical base of a ration for poultry is grain, but additions must be made to balance the grain and supply the other nutrients necessary.

From the stand-point of supplying heat and energy to the chick, there is probably no better grain than ground yellow maize, which contains large amounts of vitamin A, which is believed to be essential to normal growth, development, and good health. Protein for muscle and tissue building is best supplied by dried buttermilk, meat, or meat meal. Milk in some form is almost indispensable in rearing chickens. Dried buttermilk is preferred, but it must be of good quality.

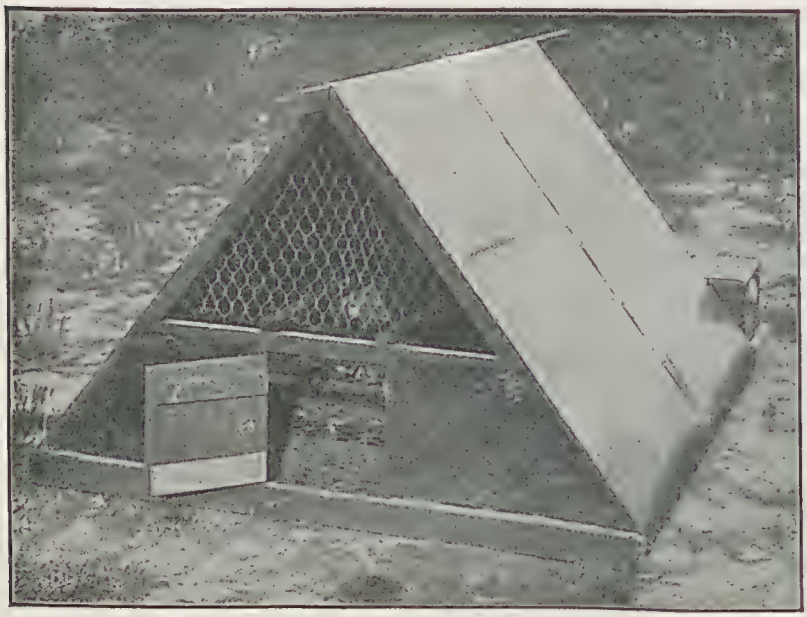
Minerals most needed by chickens are calcium and phosphorus, and should be supplied in the shape of good-quality bonemeal. In all good chick mixtures finely-crushed shell is included, but again it must be of good quality. It is sometimes thought that shell is included only to help the chicken grind the food as it passes through the gizzard; it may help in that direction, but good shell contains over 90 per cent. carbonate of lime, which is partly assimilated by the chick and helps in the formation of bone.

There are several systems of feeding chickens, and, though poultrymen differ in their opinions, all experienced men agree that, while foods may be mixed in different ways, the quality of the ingredients must be of the best if the chicks are to be reared successfully. Under certain conditions a poultryman may be excused for feeding adult fowls on second-quality foods, but for chicks expected to grow into profitable egg producers only the best of foods should be used. If he cannot mix the foods himself, he should make sure that his merchant is not only reliable, but also has some knowledge of the requirements of the chicks. From time to time chick foods that are anything but good are brought under the notice of the Department of Agriculture.

Those who are already successful in their chicken-rearing operations should continue with their present methods, but to those who are not getting satisfactory results in rearing the following mixture is recommended:

80 lb. maize-meal.
40 lb. ground wheat.
20 lb. ground hulled oats.
20 lb. bran.
6 lb. charcoal.
5 lb. bone-meal.
20 lb. dried buttermilk.
5 lb. fine shell grit.
1 lb. salt.
1 lb. superphosphate.

The colony system at the State Research Farm, Werribee.



Portable house—front view.

This mixture can be given either as a dry or a wet mash. The usual custom is to have a dry mash always available, and to feed a wet mash twice during the day. It can be fed from the first feed, when the chicks are two days old until they reach maturity. For a scratch grain, 40 lb. cracked wheat, 80 lb. cracked maize, and 20 lb. cracked hulled oats make a very good mixture.

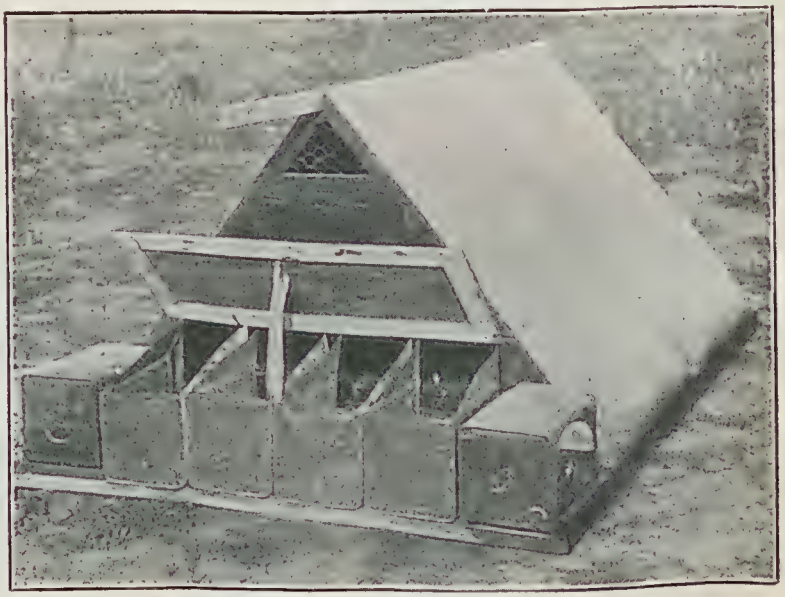
Rearing Chickens on the Colony System.

The value of portable colony houses for rearing chickens is not fully realized by a large number of poultry-keepers, and there is no doubt that, if this system were better understood, it would be far more extensively adopted.

The colony system is more economical in regard to accommodation, labour, and food. After leaving the brooders, chickens reared in this way thrive much better than those enclosed in small, bare yards. In the latter, the ground gradually becomes sufficiently tainted to affect the air close to the ground on which the chickens live. After a few days they know every foot of the ground, and, becoming weary with the monotony, will not run about as they would if given greater opportunities of finding natural food, such as insects, grubs, seeds, &c., and a variety of green food. By keeping the birds moving about, they will attain good health and proper development.

The Colony House.

Portability, adaptability to weather conditions, low cost, and simple construction are the features of the colony poultry-house illustrated herewith. Such a house has been used by the writer for many years with highly satisfactory results. Its dimensions are 6 feet x 5 feet x 4 feet high, and it is built tent shape. A house of this size will accommodate 50 chickens, 10 or 12 weeks old, for from 6 to 8 weeks, when the number should be thinned down by the removal of the most forward pullets to their permanent laying quarters.



Portable house—back view.

In this design provision has been made so that the house can be conveniently used for laying hens after the chicken season is over, and it will provide accommodation for from 20 to 24 layers. Portion of the back of the house, being hinged, can be lifted up, and four nests, made from kerosene tins cut as directed below, fitted in. The entrance to the nests is from inside the house, thus the hinged portion forms the lid to the nests, and can be lifted when the eggs are being gathered. The width of the back of the house allows space for six kerosene tins—four nest boxes, one for a water tin, and one with separate spaces for shell grit and charcoal. These tins all rest on the frame of the house, and, therefore no inconvenience is experienced when shifting the house. The building is so light that it can easily be shifted by two children ten or twelve years of age, and its shape is such that even heavy wind has no effect on it.

These houses may be used without floors, but it is advisable to place in them a frame of 2-inch x 1-inch battens on edge, and covered with wire-netting stretched tight. A big advantage of this frame is that, should rain-water run under the house, the birds have a dry place on which to stand. Further, when the house is being used for laying hens, it prevents them carrying dirt into the nests and soiling the eggs. It also prevents loss from smothering. Every poultry man knows the risk of shifting growing chickens to new quarters. Great loss is experienced at times, as the chickens often sleep on the floor and crowd one on top of another, with the result that those underneath smother. With this netting floor, which is 2 inches off the ground, even if the chickens do heap up, those underneath get sufficient air through the meshes.

These houses are particularly recommended for use in the orchard. By shifting them between the trees a few feet every two or three days, the ground will be well manured, the birds will be greatly benefited by the shade of the trees, and in their foraging will rid the orchard of many destructive insects. Several houses can be used in the same orchard or paddock, if placed 50 or 60 feet apart. Movable hurdles are used to make a small enclosure round the house for two or three days. By the end of that time the birds will have become accustomed to their particular house, and the hurdles can then be taken away and used for another house.

It is seldom, even on a large farm, that a great number of chickens are to be put out at one time; therefore, a few hurdles are sufficient. Five, made of 2 x 1 hardwood, 10 feet long and 3 feet high, covered with wire netting, should be enough for one house. Of course, hurdles of this height would not keep birds in for any length of time; but it will be some days before chickens, ten or twelve weeks old, attempt to fly over. By that time they will be well used to their new house, and the hurdles may be removed; for even though the young birds from the various houses mingle during the day, especially at feeding time, at roosting time they will return to their respective houses.

If it is desired to run cockerels in the same paddock as pullets, a suitable enclosure can easily be made. What is required is a set of four frames of 3 x 1 hardwood battens, 18 feet long, 6 ft. 4 in. high, with two bars 6 feet from each end, and covered with 72 x 2 wire netting. The battens at each end of the frame should be cut 6 ft. 10 in. long, allowing 3 inches to project above and below the frame. The projecting pieces at the bottom should be pointed, so that when erected they can easily be driven into the ground. A loop of hoop-iron may be slipped over the projecting pieces at the top, coupling them together. If the loops be made a neat fit, they will hold the frames very securely. This method of fastening the hurdles is much better than simply nailing them, as they can then be taken down and erected much more quickly, and without damage to the hurdles. Access to the yards is easily gained by slipping off the loop at one corner and stepping through; but, if required, it is a simple matter to let a small gate into one of the frames. This, however, probably will not be necessary.

A yard of this size contains over 300 square feet, and is sufficient for 50 chickens for several days. At the end of that time the house can be shifted, and the frames re-erected on fresh ground in a few minutes.

The transferring of chickens from the brooders to these colony houses should be done late in the afternoon. After feeding they should be placed in the colony house, the door closed, and the hurdles placed in position round the house. They should be left till next evening, when the door can be opened and feed and water supplied. After feeding they will return to the house to sleep without any trouble; in two or three days the hurdles can be removed and used for the next lot to be put out. When shifting the houses they

should be kept about the same distance apart, and not moved too far at one time (a few feet is sufficient), otherwise there is a danger of the birds refusing to go to the house in its new position, and they will camp on the ground where the house last stood.

Materials for the House.

The material required for the construction of the house and hurdles described is as follows:—

For the house—
- Two pieces of 3 x 1 hardwood, 7 ft. 2 in. for the bottom.
- Two pieces of 3 x 1 hardwood, 4 ft. 10 in. for the bottom.
- One piece of 2 x 1 hardwood, 5 feet for the bottom.
- Six pieces of 2 x 1 hardwood, 4 feet for sides.
- One piece of 2 x 1 hardwood, 8 feet for ridge.
- Two pieces of 2 x 1 hardwood, 3 feet for perches to rest on.
- One piece of 2 x 1 hardwood, 3 ft. 4 in. to hinge nest lid to.
- One piece of 2 x 1 hardwood, 1 ft. 4 in. for ventilator at back.
- Two pieces of 2 x 1 hardwood, 1 ft. 3 in. for door frame.
- Two pieces of 2 x 1 hardwood, 5 ft. 10 in. for perches.
- One door, 1 foot square.
- Six pieces No. 14 gauge wire, 8 ft. 6 in., to support ruberoid.
- Two pieces No. 2 ply ruberoid, 8 ft. 4 in. for roof.

For front—
- One kerosene tin flattened out and cut in half—half to cover in each side of door.
- One pair of 1½-inch butt hinges.
- One piece of wire netting, triangle shaped (3 feet at base, 2 feet to peak).

For back—
- One and a half kerosene tins flattened out—one above the nest boxes and a quarter on each side of them.
- One piece of tin, 3 ft. 3 in. by 1 ft. 3 in. (cover for nests).
- One pair butt hinges, 1½ inches for cover.
- One piece of wire netting for ventilator, 1 foot at base, 8 inches to peak.
- Four kerosense tins for nests.
- One kerosene tin for water.
- One kerosene tin for shell grit and charcoal.

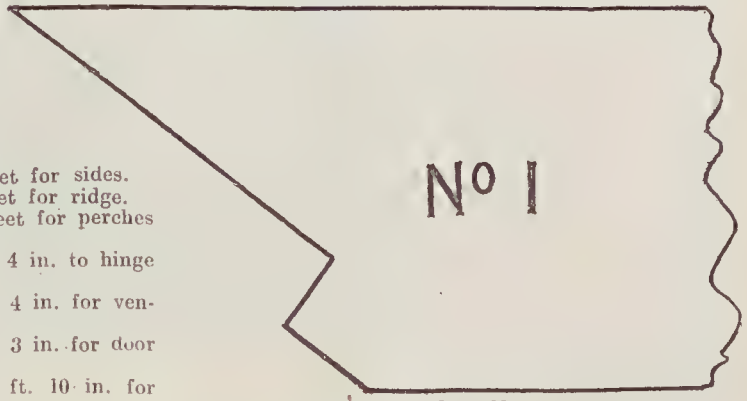
For floor frame—
- Two pieces 2 x 1 hardwood, 5 ft. 7 in.
- Four pieces 2 x 1 hardwood, 4 ft. 7 in.
- One piece wire netting, 5 ft. 7 in. x 4 ft. 7 in., 1½-in. mesh.

For hurdles—
- Two pieces 2 x 1 hardwood, 10 feet, top and bottom rails.
- Two pieces 2 x 1 hardwood, 3 ft. 10 in., for ends.
- One piece 2 x 1 hardwood, 3 ft. 4 in., for centre stay.
- Piece of wire netting 10 feet x 3 feet.
- To make loops of hoop-iron, cut pieces 11½ inches long, lap 1 inch, and rivet.

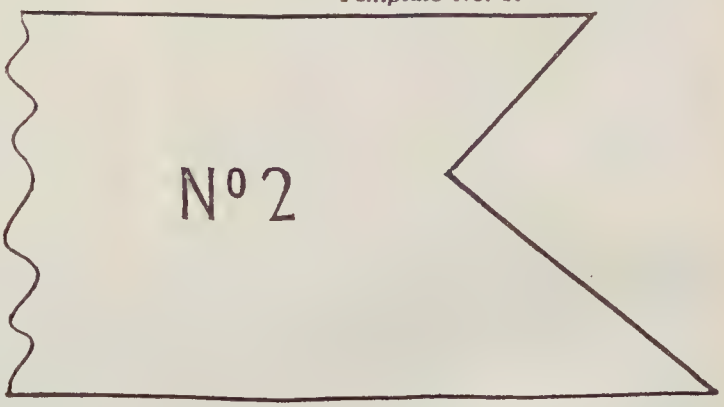
For large-frame hurdles—
- Two pieces 3 x 1 hardwood, 18 feet long, top and bottom rails.
- Two pieces 3 x 1 hardwood, 6 ft. 10 in. long for ends.
- Two pieces 3 x 1 hardwood, 6 ft. 4 in. long, for stays.
- 6 yards wire netting, 72 x 2.
- To make loops or hoop-iron, cut pieces 1 ft. 3 in. long, lap 1 inch, and rivet.

How to Build the House.

Scarf out sufficient at the end of each of the 7-ft. 2-in. pieces of timber to take a 2-in. x 1-in. batten; lay the two 7-ft. 2-in. pieces 4 ft. 10 in.



Template No. 1.



Template No. 2.

apart with the scarfed edges up, and nail on the 5-ft. 2-in. x 1-in. piece. Next place one of the 4-ft. 10-in. pieces 14 inches from this, and the other 4-ft. 10-in. piece between the ends of the 7-ft. 2-in. pieces, and nail securely together. Turn this over, and it will form the bottom frame of the house. Then take four pieces of 2 x 1, 4 feet long, and cut the ends by the template shown, which is actual size, No. 1 for the top to receive the ridge pole, No. 2 for the bottom, which fits the bottom frame. Place two of these pieces in position at the front, and two at the back, and nail to the 3 x 1 frame inside; put the 8-ft. ridge pole in the places cut to receive it, allowing it to project 6 inches in front and 18 inches at the back. This provides a good hand hold for shifting

the house about. Then take the other two pieces of 4-ft. timber; use the same template, but cut the angles on the flat as these two pieces are for the centre of the house where the ruberoid joins. Next cut the two pieces

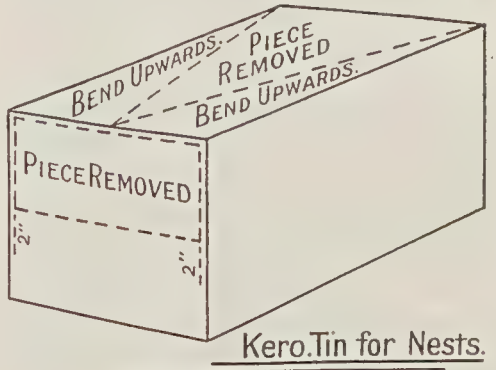
of 3-ft. timber so that they will fit between the uprights at each end of the house; on these the perches will rest. Cut the piece of 1 ft. 4 in. to fit between the uprights at the back 8 inches from the top; this is for ventilation. Then nail the two pieces of 1 ft. 3 in., 1 foot apart, to the bottom frame at the front, so as to form the door frame; the tops of these help to support the 3-ft. piece on which the perches rest. Nail the piece of 3 ft. 4 in. across the back, 1 foot from the bottom frame, so that the hinged lid of the nest tins can be hung to it. Then take the six pieces of 14-gauge wire; drill holes 8 inches apart in the bottom frame of the house; fasten one end of each of the wires in these holes, pass the other ends over the ridge pole, stretch fairly tight, and fasten to the frame at the bottom on the other side. These wires support the ruberoid, and prevent it from sagging. One kerosene tin flattened out and cut in half is sufficient to close in the spaces each side of the door; the space above the door is covered by a piece of wire netting. To close in the back, make a light frame, and cover with a piece of tin 3 ft. 3 in. x 1 ft. 3 in. By hinging this to the 3-ft. 4-in. piece of timber at the back a lid is made for the nest tins. Flatten out a whole kerosene tin and half of another. Spread a quarter of the flattened tin over the spaces each side of this hinged lid; the balance will be required to close in the space between the hinged lid and the ventilator. Two inches of the bottom of this tin should be bent outwards at right angles, in order to prevent rain running down the back of the house into the nests. The ventilator space, about 1 foot by 8 inches to the peak, should be covered with a piece of wire netting. Bore holes 1 foot apart in the two pieces of timber that are to support the perches, and corresponding holes in the ends of the perches. They can then be held in position by placing a nail in the holes. If this be done, it will be easy to remove the perches at any time for inspection for mites, &c. The ruberoid can then be tacked on, the door fitted, and the house is complete.

The most convenient way to catch birds in these houses is to have a light stick or cane 6 feet long, with a piece of No. 8 fencing wire fastened to the end, and bent as shown hereunder:—

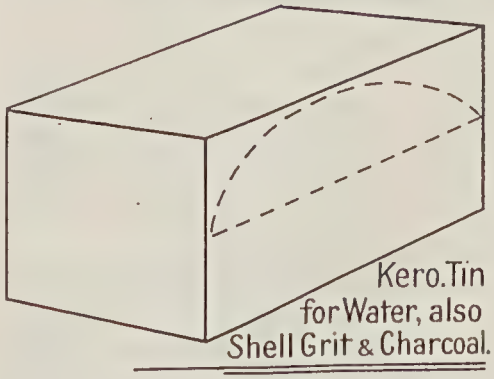
After a little practice with this device any bird in the house can be quickly caught by the leg.

Making the Nest.

To make the nests cut kerosene tins along the dotted lines as indicated in the accompanying diagrams. Remove the pieces at the end dotted round, and then cut down 2 inches on each side where indicated by dotted lines. Cut out the three corner-piece on the top and bend the remaining pieces upwards. The piece of tin which has been cut down 2 inches in the



Kero. Tin for Nests.



front should be bent to fit over the 3 x 1 batten on the bottom frame of the house. This will be sufficient to hold it in position without nailing; the back of the nest tin will rest on the 2 x 1 piece of timber. These nest tins should always be removed when the house is to be used for chickens, or they will all crowd into them to sleep.

Potato Manurial Trials

Results for 1932-33

By J. T. Ramsay, Potato Expert.

The results of the experiments at Koroit, Musk, Beech Forest, Romsey, and Trentham East were published in the August issue of this Journal.

WHEATSHEAF.

HIGHER than average yields were harvested from the experimental plots at Wheatsheaf, in the Daylesford district, this year. Situated about 2,000 feet above sea level, with a rainfall of approximately 30 inches per annum, this district lies at the north-western end of an extensive belt of volcanic soil, which is largely devoted to potato cultivation. None of the country in this area appears to give a profitable response to heavy dressings of phosphatic fertilizer, although for the most part it shows a marked deficiency in phosphoric acid. About 3 to 4 cwt. of super. per acre appears, from the results of a number of years, to be the maximum quantity that can be applied with profit, but the benefit from that quantity is very noticeable.

During the past season a dressing of 4 cwt. super. per acre gave a return of 7 tons, against a yield of 5 tons per acre from the unmanured plots—an increase of 40 per cent. Over a period of five years, the average return from the plot treated with 4 cwt. super. per acre has been 48 per cent. greater than that from the unmanured plots.

The combination of manures which has shown to the greatest advantage each year since these trials were begun in 1928-29 is the "3 and 1," i.e., 3 cwt. super. and 1 cwt. ammonium sulphate per acre, which has resulted in an average increase of 72 per cent. for the five years. A mixture of 3 cwt. super. and 2 cwt. ammonium sulphate was tried last season at Wheatsheaf, but failed to show any improvement. However, as this is the result of one year's test only, it cannot be taken as conclusive, and the mixture will be tried out further in subsequent tests.

The increases obtained from the use of the various manurial treatments at Wheatsheaf are substantial, and indicate very clearly the benefits to be derived from their use. The yields obtained in the 1932-33 season are shown in Table I., while Table II. sets out the average results for five years.

TABLE I.—POTATO MANURIAL TRIALS, WHEATSHEAF, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Increase due to Manure.	Percentage Increase.
	T. C.	T. C.	%
Super., 2 cwt. ..	6 6	1 6	26
Super., 3 cwt. ..	6 8	1 8	28
Super., 4 cwt. ..	7 0	2 0	40
No manure	5 0	..	..
Super., 3 cwt. + amm. sulp., 1 cwt. ..	7 7	2 7	47
Market garden, 3 cwt. ..	7 2	2 2	42
Basic phosphate, 3 cwt.	6 6	1 6	26
Super., 3 cwt. + amm. sulp., 2 cwt. ..	7 5	2 5	45

TABLE II.—AVERAGE RESULTS, WHEATSHEAF, FOR FIVE YEARS, 1928-29 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 2 cwt.	4 13	35
Super., 3 cwt.	4 17	41
Super., 4 cwt.	5 2	48
No manure	3 9	..
Super, 3 cwt. + amm. sulp., 1 cwt.	5 19	72
Market garden manure, 3 cwt. ..	5 2	48
Basic phosphate, 3 cwt. ..	4 17	41

CHILDERS (THORPDALE).

The Childers district was subject to a prolonged spell of dry weather from the third week in December until the middle of February, a condition of things unusual to that part of Victoria, which has an average rainfall of from 40 to 50 inches. This had the effect of curtailing yields, but despite the lack of rain, the differences in weight of crops harvested from plots treated with the various manures, as compared with those from unmanured plots, was very marked, amounting to 98 per cent. in the case of the heaviest yield, which was from the dressing of 6 cwt. super. and 2 cwt. ammonium sulphate per acre.

Although this "6 and 2" mixture was responsible for the heaviest actual weight of marketable tubers, the difference between its performance and that of the "6 and 1" was not appreciable, the increased production over the latter being only 3 cwt. per acre. The "6 and 1" mixture gave a return of 4 tons 16 cwt. to the acre, equal to an improvement of 92 per cent. over the unmanured plots.

The application of an extra 1 cwt. of ammonium sulphate per acre in the various districts throughout Victoria where potato trials are conducted promises to be very interesting. For the first year of its trial appreciable increases have been gained only in the red volcanic belt in the central highlands, where the land has been under crop for many more years than the other parts of the State where potatoes are now grown. No increases of consequence occurred in the Gippsland or Beech Forest districts, which have a heavy annual rainfall.

TABLE III.—MANURIAL TRIALS, CHILDERS, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Increase due to Manure.	Percentage Increase.
	T. C.	T. C.	%
Super., 3 cwt. ..	3 15	1 5	50
Super., 6 cwt. ..	4 3	1 13	66
Super., 6 cwt. + amm. sulp., 1 cwt. ..	4 16	2 6	92
Super., 6 cwt. + amm. sulp., 2 cwt. ..	4 19	2 9	98
No manure	2 10	..	..
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt. ..	4 16	2 6	92
Market garden, 6 cwt. ..	3 12	1 2	44
Basic phosphate, 6 cwt.	3 2	0 12	24

The Childers country has always shown a considerable response to manure. Trials have been carried out there for ten years, and that the soil of the district is extremely sensitive to manuring is shown in Table IV., in which are set out the average results over that period.

TABLE IV.—AVERAGE RESULTS, CHILDERS, FOR TEN YEARS, 1923-24 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 3 cwt.	4 10	95
Super., 6 cwt.	4 19	115
Super., 6 cwt. + amm. sulp., 2 cwt.	*4 19	*98
No manure	2 6	..
Super., 6 cwt. + amm. sulp., cwt.	5 17	154
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt.	5 10	139
Market garden manure	†3 14	†60
Basic phosphate, 6 cwt. ..	†2 18	†26

* One year only. † Four years only.

The rates per acre for market-garden manure and basic phosphate which, until four years ago, were applied at the rate of three cwt. per acre, have since that date been increased to six cwt. per acre.

The most effective dressing has been the "6 and 1" mixture, which for ten years has given an average increase over "no manure" of 3 tons 11 cwt. per acre, or 154 per cent. The average yield for the same period of the unmanured plots is 2 tons 6 cwt. per acre. This is probably the widest difference between yields obtained from manured and unmanured plots in potato manurial trials in Victoria. The soil in which the Childers plots are located is a clay loam.

All manures at Childers show significant increases in yield, of which none are so marked as the result from the 6 cwt. super. and 1 cwt. ammonium sulphate mixture. The reduction in yield from the use of potash is noticeable both in last season's result and the returns covering the ten-year period.

Last year it was suggested that a trial should be made with sulphate of potash applied at a fairly heavy rate, and at a date some months prior to the sowing of the crop. This was done at two centres—Childers and Millbrook. The potassium sulphate was broadcast to a section of the site of the plots, and approximately two months prior to the date of planting. It was sown in a direction across the line of the other manures, so that its effect

might be noted on all manurial variations. The results are given in the accompanying tables for Childers and Millbrook.

TABLE V.—POTATO MANURIAL TRIALS, CHILDERS, 1932-33.

(Test conducted to ascertain the effect of the addition of 2 cwt. potassium sulphate to the ordinary manurial treatment.)

Manure per Acre.	Yield without Potash.	With with 2 cwt. Potassium Sulphate added.
	T. C.	T. C.
Super., 3 cwt.	3 15	3 10
Super., 6 cwt.	4 3	3 18
Super., 6 cwt. + amm. sulp., 1 cwt.	4 16	4 11
Super., 6 cwt. + amm. sulp., 2 cwt.	4 19	4 11
No manure	2 10	2 8
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt.	4 16	4 6
Market garden, 6 cwt.	3 12	3 12
Basic phosphate, 6 cwt. ..	3 2	2 14

From the above table, it will be seen that during the past season this heavy application of potassium sulphate had the effect of producing, if anything, a slight depression in the yield. The causes of these depressions in the yield from the use of potassium sulphate are obscure, and it is proposed to continue this particular treatment next season.

FISH CREEK.

The yields in the Fish Creek district promised to be very heavy until the finish of the flowering period, when the tops were checked with blight fungus, which prevented them finishing growth, but did little damage to the tubers. Planting was completed at the end of October, 1932, and there was a 10-in. rainfall between that time and the date of harvesting.

The unmanured plots averaged 5 tons 6 cwt. marketable tubers to the acre. The application of 6 cwt. super. and 1 cwt. ammonium sulphate gave the highest return, viz., 8 tons 10 cwt. per acre, an increase of 60 per cent. This manure has been consistently profitable, and over the period of five years of the manurial trials at Fish Creek, it heads the increases from the use of fertilizers with an average of 58 per cent.

The dressing of 6 cwt. super. and 2 cwt. ammonium sulphate yielded much less than the "6 and 1." This may possibly be accounted for by soil variation, although the whole of the paddock appeared to be of uniform type, and had been down in grass for about nine years.

TABLE VI.—POTATO MANURIAL TRIALS, FISH CREEK, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Increase due to Manure.	Percentage Increase.
	T. C.	T. C.	%
Super., 3 cwt. ..	7 0	1 14	32
Super., 6 cwt. ..	8 0	2 14	51
Super., 6 cwt. + amm. sulp., 1 cwt. ..	8 10	3 4	60
Super., 6 cwt. + amm. sulp., 2 cwt. ..	7 15	2 9	46
No manure	5 6	..	..
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt. ..	7 5	1 19	36
Market garden, 6 cwt. ..	6 12	1 6	24
Basic phosphate, 6 cwt.	5 14	0 8	7

The increases throughout the five years during which the tests have been conducted are substantial, and show a profitable return for the expenditure on fertilizers.

TABLE VII.—AVERAGE RESULTS, FISH CREEK, FOR FIVE YEARS, 1928-29 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 3 cwt.	6 17	40
Super., 6 cwt.	7 8	51
No manure	4 18	..
Super., 6 cwt. + amm. sulp., 1 cwt.	7 15	58
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt.	7 2	45
Market garden, 6 cwt.	*5 19	*34
Basic phosphate, 6 cwt. ..	*5 12	*26

* Four years only.

ILLOWA.

The Illowa district is the earliest in which experiments are conducted, and crops were sown in mid-August. Harvesting took place at the end of January, 1933. Situated on the seaboard, a few miles to the west of Warrnambool, this district is practically free of frost damage, and consequently local growers specialize in early potato production. The variety used in the manurial trials was Up-to-Date, which was obtained from Portland.

All of the manured plots showed considerable increases over those on which no manure was used, the latter giving the very light yield of 2 tons 15 cwt. per acre. The heaviest return came from plots on which 4 cwt. super. per acre was used. These gave an average increase of 169 per cent., while this was followed closely by the "3 and 1" super. and ammonium sulphate mixture, with an average increase of 165 per cent. This is the first year at Illowa that the super. and ammonium sulphate has failed to give the heaviest yield, but over the previous five years it has given the highest average production.

The soil, a rich volcanic loam, had been out of cultivation for a period of five years preceding last season's potato crop. While the yields recorded are good, they are substantially lower than those harvested from this country in the past. In the season 1930-31, for instance, the "3 and 1" mixture yielded 16 tons 12 cwt. marketable tubers per acre, while the no manure plots averaged 12 tons 1 cwt.

TABLE VIII.—POTATO MANURIAL TRIALS, ILLOWA, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Increase due to Manure.	Percentage Increase.
	T. C.	T. C.	%
Super., 2 cwt. ..	5 13	2 18	105
Super., 3 cwt. ..	7 3	4 8	160
Super., 4 cwt. ..	7 8	4 13	169
No manure	2 15	..	..
Super., 3 cwt. + amm. sulp., 1 cwt. ..	7 6	4 11	165
Super., 3 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt. ..	5 7	2 12	94
Market garden, 3 cwt. ..	6 3	3 8	123
Basic phosphate, 3 cwt.	5 7	2 12	94

Blight, both on plants and tubers, did much to reduce the Illowa early crop last year—the estimated reduction being about 20 per cent. Some eelworm affection was recorded, but, curiously enough, this was confined for the most part to the unmanured plots. The figures giving the average returns for the past five years show appreciable increases in all cases where manure was used. The "3 and 1" super. and ammonium sulphate showed to distinct advantage over the other manures, with an average increase of 3 tons 8 cwt. per annum, or 61 per cent. The next best to this was the complete mixture—super. ammonium sulphate and potassium sulphate, which gave an average increase of 56 per cent. at an added cost of over £1 per acre as compared with the cost of the "3 and 1" mixture.

TABLE IX.—AVERAGE RESULTS, ILLOWA, 5 YEARS, 1928-29 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 2 cwt.	7 9	34
Super., 3 cwt.	8 4	46
Super., 4 cwt.	8 7	48
No manure	5 11	..
Super., 3 cwt. + amm. sulp., 1 cwt.	8 19	61
Super., 3 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt.	*8 14	*56
Market garden, 3 cwt.	7 11	36
Basic phosphate, 3 cwt. ..	6 17	23

* Four years only.

WARRAGUL.

The plots on which the Warragul trials were conducted are situated on the farm of Mr. S. Adkins, in a paddock which had been under grass for a considerable time, and which had been repeatedly top-dressed during that period. This would account for the good yield from the unmanured sections, which gave 6 tons 10 cwt. per acre of marketable sized tubers. The soil is a clay loam. The variety used was Coronation, and planting was done at the end of November, 1932.

TABLE X.—POTATO MANURIAL TRIALS, WARRAGUL, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Increase due to Manure.	Percentage Increase.
	T. C.	T. C.	%
Super., 3 cwt. ..	7 9	0 19	15
Super., 6 cwt. ..	7 11	1 1	16
Super., 6 cwt. + pot. sulp., 1 cwt. ..	9 7	2 17	44
Super., 6 cwt. + pot. sulp., 2 cwt. ..	9 6	2 16	43
No manure	6 10	..	..
Super., 6 cwt. + amm. sulp., 1 cwt. ..	9 10	3 0	46
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt. ..	9 10	3 0	46
Market garden, 6 cwt. ..	7 8	0 18	14
Basic phosphate, 6 cwt.	7 8	0 18	14

Notwithstanding the high yield from plots on which no manure was used, the addition of manures at the standard rates produced considerable improvement in the yield. The

highest returns were from "6 and 1" super. and ammonium sulphate, and the complete manure—6 cwt. super., 1 cwt. ammonium sulphate, and 1 cwt. potash. Both these treatments gave yields of 9 tons 10 cwt. per acre, or 46 per cent. increase. Hitherto, Warragul has been the only centre at which potash was responsible for any significant increase in yield, and the average returns for seven years disclose that the super. and potash mixture still maintains the lead with 111 per cent. increase. The complete manure gave the same increase, but cannot be ranked with super. and potash on account of its greater cost.

Last season a new plot was treated with 6 cwt. super. and 2 cwt. potassium sulphate. This extra potash did not increase the yield, as will be seen by reference to Table X., giving the Warragul returns for 1932-33.

TABLE XI.—AVERAGE RESULTS, WARRAGUL, FOR SEVEN YEARS, 1926-27 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 3 cwt.	7 8	66
Super., 6 cwt.	8 5	85
Super., 6 cwt. + pot. sulp., 1 cwt.	9 8	111
No manure	4 9	..
Super., 6 cwt. + amm. sulp., 1 cwt.	8 16	97
Super., 6 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt.	9 8	111
Market garden manure, 6 cwt. ..	*7 3	60
Basic phosphate, 6 cwt. ..	*6 8	42

* Four years only.

In addition to the manurial trials, a test was made with three leading varieties, with the following results:—

TABLE XII.

Variety.	Yield per Acre.
	T. C.
Carman 3	9 18
Snowflake ..	7 6
Late Manistee ..	6 11

Some growers are of opinion that the Snowflake variety is a heavier cropper than Late Carman, but during the period in which these trials have been made, and also in the field competitions, this has not proved to be the case.

There are seasons when it would seem that Snowflake is the heavier cropper, but given fair seasonal conditions the Late Carman will prove superior. The peculiarity of the Snowflake variety, of making its weight of tubers right at the end of the season, gives it a big advantage when a dry spell occurs in the middle of the growing period. The Snowflake, under such conditions, does not suffer so greatly as does the Carman, and comes away again with the late rains. The Carman, having the characteristic of forming tubers early, is apt to suffer, and has a tendency to second growth under such conditions. Further, since conditions favouring blight usually are experienced in midseason rather than later, the Carman is more likely to suffer from tuber infection, which the Snowflake may miss because of its late developing habit. Blight affection, however, is not common in Victoria, as the seasons generally are interspersed with short periods of warm weather, with hot north winds, which are effective as a blight prevention agent.

The Carman is at its peak of quality immediately it is ripe, whereas the Snowflake is not at its best until a month or two after digging.

MILLBROOK.

In addition to manurial trials, a number of other tests were conducted on the red volcanic soil at Millbrook last season. These included "Immature *v.* Ripe Seed," "Time of Cutting," "Effect of Dipping," "Bag *v.* Boxed Storage of Seed," "Bare Fallow *v.* Green Manure," "Variety," and "Cultivation" tests.

Immature v. Mature Seed Test.

In the "Immature *v.* Ripe Seed" trial an increase in yield of 31 per cent. is shown in favour of the immature seed. The seed used in this test was Late Carman, and was obtained in the previous season from Beech Forest. The treatment given to both classes of seed in the matter of storage, soil, manuring, spacing, cultivation, &c., was identical, the only variation being that portion of the seed was harvested in an immature condition, while the other portion was allowed to ripen prior to digging. Despite the fact that the superiority of immature to ripe seed has been demonstrated for years, some growers have not yet adopted this means of increasing their returns.

The average returns from immature seed at Millbrook over a period of eight years show an increase of 27 per cent. in the crop of marketable tubers, the yields being:—Ripe

seed, 6 tons 9 cwt. per acre; immature seed, 8 tons 5 cwt.—an average increase of 1 ton 16 cwt. per acre. The yields for last season are shown in Table XIII.

TABLE XIII.—IMMATURE v. RIPE SEED, MILLBROOK, 1932-33.

	T. C.
Immature Seed	6 18
Ripe Seed	5 5
Increase due to use of immature seed ...	1 13 or 31 per cent.

Time of Cutting.

The test conducted to ascertain the most suitable time for cutting the seed showed that it should be done as short a time as possible before planting. The variation in times of cutting for the test ranged from fresh cut at planting to three weeks. Table XIV. shows a progressive reduction in the yield of the crop of table-sized tubers, as the distance in time between cutting and planting increased. This agrees with the results of previous tests.

TABLE XIV.—TIME OF CUTTING TEST, MILLBROOK, 1932-33.

—	—	Percentage Decrease, Compared with Fresh Cut.
	T. C.	%
Fresh cut seed	4 17	..
Cut one week	3 17	21
Cut two weeks	3 1	37
Cut three weeks	2 15	44

Dipping the Seed.

Substantial increases in yield were obtained where seed had been treated with formalin as compared with untreated seed. The seed was dipped, before the buds were showing, in a solution made up by adding 1 lb. formalin to 20 gallons of water. The period of immersion was 1½ hours. The results are shown in Table XV.

TABLE XV.—FORMALIN DIPPING TEST. MILLBROOK, 1932-33.

—	—	Percentage Increase, Due to Dipping.
	T. C.	%
Untreated seed	3 17	..
Treated	6 18	80

This increase of 80 per cent. is one of the largest so far obtained in departmental trials by the use of dipped compared with undipped seed. From the start of the season the section planted with the dipped seed showed much better colour and vigour than the undipped section, and this difference in appearance was observed throughout the season. The Millbrook area was subject to a very dry spell from the third week in December, 1932, until the second week in February, 1933, and a possible explanation of the difference in the yields in the dipping test is that the treated seed, being the more vigorous, was better able to withstand the adverse weather conditions during the period mentioned. During the past season the effect of neglect to dip seed was strongly in evidence in certain district crops by the amount of rhizoctonia scab present. In one case on swamp country a grower, who previously had practised dipping, neglected to do so last season, with the result that his crop was affected with scab to the extent of 40 to 50 per cent.

Formalin dipping is the cheapest form of chemical control for certain common diseases affecting the potato crop.

Boxed v. Bagged Seed.

In the "Storage of Seed" test, the systems of storage tested were Boxed Seed versus Bagged Seed.

At planting time at Millbrook (mid-November), the boxed seed was in excellent condition, with buds suppressed by the combined action of light and air, and nicely greened and tough. The bagged seed on the other hand was overgrown and brittle.

TABLE XVI.—BOXED VERSUS BAGGED SEED, MILLBROOK, 1932-33.

—	Average Three Tests Made from Three Manurial Variations.
	T. C.
Boxed seed	6 13
Bagged seed	2 17
Increase due to boxing	3 16 or 133 per cent.

The boxed seed was planted in perfect condition, with buds intact, and vigour unimpaired. The bagged seed suffered considerable damage to the sprouts by unpreventable breakage.

The boxed seed showed through the ground three weeks ahead of the bagged, while the difference in the appearance of the two was

most noticeable. The plants coming from boxed seed were full of vigour, and of a good colour, while those from bagged seed were spindly and sickly. The figures given in Table XVI. are the averages from three manurial variations on the two classes of seed.

Green Manurial Test.

To ascertain the value of green manuring as a means of reconditioning soils that have been for many years under practically constant cultivation, a series of tests was conducted at Millbrook. In March, 1932, an area was sown with rye grain at the rate of nearly two bushels per acre, with 90 lb. super. per acre. Germination was good, and the crop did fairly well. About the middle of September, 1932, when about 2 ft. 6 in. high, it was ploughed in. The covering of this green manure crop by the plough—a 14-inch mouldboard—was not so effective as it would have been had the crop been a foot or so higher. As a result, decomposition took place rather more slowly than desired. However, when the potato crop was planted in November, there was little trouble experienced from the undecomposed balance of the green stuff.

Alongside this area a bare fallowed section had been set aside, and both areas, different sections of which had been treated with the manurial variations shown below, were planted with Late Carman seed, with results as shown in Table XVII.

TABLE XVII.—AVERAGE RESULTS "GREEN MANURE v. BARE FALLOW" TEST, MILLBROOK, 1932-33.

Manure per Acre.	Green Manure.	Bare Fallow.	Increase Due to Green Manure.	Percentage Increase.
	T. C.	T. C.	T. C.	%
No manure ..	3 4	1 17	1 7	73
Super., 3 cwt. ..	5 5	4 3	1 2	26
Super., 3 cwt. + amm. sulp., 1 cwt. ..	6 18	4 8	2 10	56
Super., 3 cwt. + amm. sulp., 1 cwt. + pot. sulp., 1 cwt. ..	5 19	3 15	2 4	58

As was to be expected, the highest percentage increase was obtained as the result of green manuring on the section of the potato crop receiving no artificial fertilizer. In every case, however, the increase over bare fallow was very substantial. A noticeable effect of the green manure, in addition to increasing the yield considerably, was the better shape of the tubers as compared with those harvested from the bare fallow section. This latter improvement is of considerable importance. For many years past the old cultivated soils of the State, which have been progressively robbed of organic matter, while producing tubers of high table quality, have not always produced tubers of good shape. This is due entirely to the altered physical condition of these soils, owing to the reduction in humus content. Green manuring is the only practical and economical means of correcting this physical condition, and bringing these soils back to a state which will improve their moisture-retaining capacity, and also allow tubers grown in them to develop without restriction.

Variety Trials.

The varietal tests included twelve varieties of which seven had coloured skins. The heaviest yielders were Scottish Triumph, Late Carman, and Up-to-Dates of the white skins, and Ruby Red and Plunkett of the red skins. Amongst the earlies, Earliest of All showed to least advantage, but this is explained by its being cut back severely by frost. This variety is such a quick grower that, when the frost occurred early in February, its development was at a stage making it more susceptible than than the other varieties.

The results of the variety trials are shown in Table XVIII.

TABLE XVIII.—VARIETAL TESTS, MILLBROOK, 1932-33.

Variety.	3 and 1. Weight Marketable Tubers.	3 and 1 + 2 cwt. Potash. Weight Marketable Tubers.	3 and 1 + Stable Manure 15 Tons per Acre. Weight Marketable Tubers.
	T. C.	T. C.	T. C.
Carman No. 1 ..	4 8	3 15	3 15
Earliest of All ..	4 0	4 0	4 0
Bismarck	4 6	4 6	4 7
Up to Date, Local Seed	6 5	5 2	5 11
Up to Date, Beech Forest Seed ..	7 4	5 2	5 11
Ruby Red	7 15	5 16	6 13
Late Manistee ..	5 5	4 3	5 0
Scottish Triumph ..	7 4	4 11	5 11
American Rose ..	4 3	2 15	3 9
Plunkett	5 16	3 17	4 17
Excelsior	5 5	4 9	5 0
Coronation	3 17	3 9	3 12
Late Carman ..	6 18	5 19	7 4

Cultivation Test.

The cultivation test again demonstrated the advantage to be gained from thoroughness of inter-cultivation of the crop. This test consisted of three sections, the first of which was given one horse-hoeing, the second two, and the third three. The results are shown in Table XIX.

TABLE XIX.—CULTIVATION TEST, MILLBROOK, 1932-33.

—	—	Percentage Increase.
	T. C.	%
One cultivation	4 17	..
Two cultivations	5 11	14
Three cultivations	6 14	38

Manurial Trials.

In the manurial trials at Millbrook, in addition to the standard variations adopted for the past six years, additions were made by including stable manure and a heavy dressing of 2 cwt. of potassium sulphate per acre. The stable manure was applied at the rate of 10 tons per acre, at the end of September, when the potash also was added. Both of these were applied in such a manner that they individually crossed all the other manure applications.

TABLE XX.—POTATO MANURIAL TRIALS, MILLBROOK, 1932-33.

Manure per Acre.	Weight Marketable Tubers.	Percentage Increase.
	T. C.	%
Super., 2 cwt.	4 3	26
Super., 3 cwt.	5 5	64
Super., 4 cwt.	4 8	37
No manure	3 4	..
Super., 3 cwt. + amm. sulp., 1 cwt.	6 18	115
Super., 3 cwt. + amm. sulp., 2 cwt.	5 16	81
Market garden, 3 cwt.	4 11	42
Basic phosphate	4 11	42

The results show practically no benefit from the use of stable manure, but the quality of this manure was poor, as was also its condition in regard to decomposition. The sulphate of potash at the heavier rating and earlier sowing, gave no better results than formerly. On the contrary, the potash produced a depression in every case where it was applied, the average reduction, taking all manures into consideration, being almost 12 cwt. per acre. The manure showing the greatest benefit was the dressing of 3 cwt. super., and 1 cwt. ammonium sulphate per acre. The remarkable consistency of this mixture in increasing the yield at Millbrook may be seen in Table XXII., in which are set out the results of all trials made during the past six years.

TABLE XXI.—SHOWING EFFECT OF EARLY DRESSING OF POTASH, MILLBROOK, 1932-33.

Manure per Acre	Weight Marketable Tubers.	Weight Marketable Tubers, + 2 cwt. Potash.	Weight Marketable Tubers, + Stable Manure.
	T. C.	T. C.	T. C.
Super., 2 cwt. ..	4 3	3 12	4 6
Super., 3 cwt. ..	5 5	4 8	5 5
Super., 4 cwt. ..	4 8	4 3	4 17
No manure	3 4	2 13	3 17
Super., 3 cwt. + amm. sulp., 1 cwt. ..	6 18	5 19	7 4
Super., 3 cwt. + amm. sulp., 2 cwt. ..	5 16	4 17	5 16
Market garden, 3 cwt.	4 11	4 8	4 13
Basic phosphate, 3 cwt.	4 11	4 3	4 11

TABLE XXII.—AVERAGE RESULTS, MILLBROOK, FOR SIX YEARS, 1927-28 TO 1932-33.

Manure per Acre.	Average Yield.	Percentage Increase.
	T. C.	%
Super., 2 cwt.	3 12	56
Super., 3 cwt.	4 3	80
Super., 4 cwt.	4 0	70
No manure	2 6	..
Super., 3 cwt. + amm. sulp., 1 cwt.	5 5	128
Super., 3 cwt. + amm. sulp., 2 cwt.	5 16*	81*
Super., 3 cwt. + Market garden (?)	3 18	70
Super., 3 cwt. + basic phosphate, (?)	3 8	48

* For one year only.

To determine whether the addition of potash improved the quality of the potatoes or the total yield of starch per acre, or to ascertain if possible why the crop yield was decreased by potash, several analyses were made by the Agricultural Research Chemist, Mr. W. R. Jewell, M.Sc. These, however, gave no conclusive results. Actually the potatoes grown on the "no potash" plots were superior to those from the potash-treated areas. The

former had an appreciably higher starch content on both a wet and dry basis. Potash, therefore, did not increase the total yield of starch per acre.

Very similar results are reported in a recent article by Houghland and Schricker (*J. American Society of Agronomy*, May, 1933, page 334, "The Effect of Potash on Starch in Potatoes"). This article states that in manurial trials potash was not found to increase the starch content or yield, and in the majority of cases actually caused a slight depression in the starch percentage.

The present analyses do not suggest any definite explanation of the reduction in yield due to potash. As the potash content of potatoes from the potash plot is somewhat lower, and not higher, than that of those from the "no potash plot," it would seem that at Millbrook the soil supplies all the plant's requirements of potash.

Two German workers, Tomzig and Pernice, recently published an article entitled "Causes of reduced yields of tubers and of starch in potatoes produced by various potash manures." This would indicate that the results obtained with potash in Victoria are not exceptional. The only abstract of this article available was disappointing, and gave no explanation of the results.

Books Reviewed

THE INSECT BOOK, W. W. Froggatt. (The Shakespeare Head Press Ltd., Sydney, N.S.W. Price, 2s.)

Until recently no suitable book has been available for school children who are interested in entomology. The insects of this country are so diverse in nature, and represent such unusual forms, that their study is difficult. *The Insect Book*, as written by Mr. Froggatt, a pioneer entomologist and formerly Entomologist to the Government of New South Wales, deals very clearly with all the orders represented in this country and in such a manner as to be readily assimilable by the youngest members of the community. This book can be recommended to the young student of natural history.

THE TREE BOOK, D. G. Stead. (The Shakespeare Head Press Ltd., Sydney, N.S.W. Price, 2s.)

This is a delightfully written and splendidly illustrated book. It describes an extensive collection of Australian native trees, and should be found very interesting and useful to the amateur tree lover, and as a secondary school book, in any part of Australia.

REPORT ON THE INFESTATION OF CURED TOBACCO IN LONDON BY THE CACAO MOTH, EPHESTIA ELUTELLA HB., by H. H. S. Bovingdon, Empire Marketing Board Bulletin No. 67, July, 1933.

In view of the appearance of the Cacao moth in Australia, this report will be of special interest to Victorian tobacco-growers, manufacturers, and warehousemen. In England, Mr. Bovington points out, the Cacao moth had been regarded as a pest peculiar to cocoa in storage, although it was known to feed on dried fruit, coffee, nuts, pepper, and chicory. In 1915, however, it made its appearance as a pest of cured tobacco in Russia, and again in 1919, in Bulgaria. The report gives details of the survey work done in warehouses in England and abroad, and of experimental work undertaken to ascertain the extent to which kiln-dried and flue-cured tobacco are affected. Methods of control in warehouse and store found most effective are the reconditioning of tobacco by a new machine that will destroy all states of life in the moth, and also by vacuum fumigation, or by the application of low temperatures to the leaf. During experimental work, it was conclusively proved that the moths have an overwhelming preference for bright leaf, kiln-cured tobacco.

Although the experiments have not definitely located the sources of infection, there are strong indications that the outbreaks have been caused by the presence of insects in tobacco from abroad. Bales wrapped in tarred brown paper and covered with a fine-mesh hessian have proved to be immune from attack when untorn, but, owing to the fragile nature of the wrapping, few bales reach their destination intact, and while this occurs the problem of preventing tobacco from being attacked in transit is rendered extremely difficult.

THE DOG, ITS AILMENTS AND DISEASES, B. A. McMichan, R.V.S. (Messrs. Angus and Robertson Ltd., Sydney. 4s. 6d.)

This well-illustrated volume deals with most of the diseases which attack the dog, giving, in each instance, methods by which they may be combated. It is a book that would be particularly useful to the country dog-owner, who is not always situated where he can readily obtain expert veterinary advice, and to the city owner, who may desire advice on some of the minor ailments that affect his pet. The book contains also two special sections on Tick Paralysis, and Hydatid Disease, by W. J. Stewart McKay, M.B., M.Ch., B.Sc. (Syd.).

Herd Sires and the Mount Hope Index

An Investigation on the "Victoria" Friesian Herd

By A. C. T. Hewitt, M.Ag.Sc., Dairy Herd Manager, State Research Farm, Werribee.

ALTHOUGH, numerically, the Friesian is probably the strongest breed of dairy cattle in the world, it occupies rather a minor position among the dairy cattle of Victoria. Prior to 1918 there were only two recognized breeders of Friesian cattle in this State, but in that year the Department of Agriculture here arranged with the New Zealand Department of Agriculture for an exchange of Red Poll and Friesian cattle, the latter being used to found the "Victoria" Friesian stud. About this time other breeders founded studs on local stock and stock imported mainly from New Zealand, and the Friesian breed became established in Victoria. The Departmental stud has been located at the State Research Farm, Werribee, for a number of years now, and the results obtained have fully justified its establishment.

Since this Friesian stud was founded in 1918, the cows have been tested in the Standard Herd Test, in which they have performed satisfactorily. In Table I. is set out the average production since 1927-28, the test period in each case being 273 days.

TABLE I.—AVERAGE PRODUCTION OF THE "VICTORIA" FRIESIAN STUD.

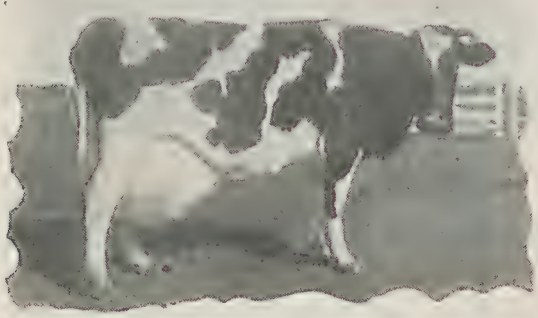
Year.	Number of Cows Tested	Milk.	Test.	Average Yield Butter-Fat.	Average Yield with Allowances.
		lb.	%	lb.	lb.
1927–28 ..	14	9,177	3·67	336·85	399·21
1928–29 ..	10	13,644	3·41	465·24	512·74
1929–30 ..	10	11,831	3·40	399·45	456·95
1930–31 ..	13	12,763	3·43	403·80	500·01
1931–32 ..	10	10,116	3·69	369·00	417·00
1932–33 ..	10	10,512	3·65	378·53	434·53
1933–34* ..	8	11,835	3·55	414·84	496·34
Average, seven years	75	11,335	3·53	396·79	461·29

* Incomplete.

In the 15 years since the herd was established, 60 cows and heifers have produced 154 milk and butter-fat records in the Standard Herd Test. Seven of these cows have produced 18 records of over 500 lb. butter-fat, the three highest producing cows being Victoria Lean Patch with records of 700 lb., 592 lb., 577 lb., 511 lb., and 506 lb. butter-fat in 273 days; Victoria Freemartin (660 lb., 654 lb., and 590 lb. butter-fat), and Victoria Songbelle (576 lb., 571 lb., 548 lb., and 537 lb. butter-fat). During this period 13 bulls have been used as herd sires, and 12 of them have tested daughters from tested mothers.

Victoria Freemartin—660 lb. butter-fat.

The present Friesian stud at Werribee comprises 39 females and two herd sires, namely—Victoria Joyous Mercedes (985) (dam: Victoria Joybell, 565 lb. butter-fat; sire: Dominion Woodcrest Piebe Mercedes), and Victoria Double Top (1354)



Victoria Lean Patch—700 lb. butter-fat.

(dam: Victoria Top Patch, 459 lb. butter-fat; sire: Dominion Oakdale). All members of the stud are descended directly from the original importations from New Zealand without any outcrossing.

The Mount Hope Index.

The selection of the herd sire is one of the most difficult problems the dairy farmer has to face. Recent research has shown that type can give very little indication of the economic dairy characteristics of the animal. Scott (England) has shown that the chances of procuring a herd sire that will improve production when the selection is done on type alone are only about 20 per cent. The production of the dam of the herd sire is usually taken as a guide when purchasing a bull, and, although this is a much better indication of his likelihood to beget high-producing daughters, it is not a perfect guide. The breeder is thus limited to the progeny test before the dairy qualities of the herd sire can be accurately gauged.

Unfortunately the majority of bulls have gone to the butcher before an estimate can be made of their value. If a bull is worth selecting as a herd sire, and if his calves are satisfactory, he is well worth keeping until his daughters are herd-tested and the progeny test applied. Bulls that pass the progeny test are known as proven sires, and they should be retained and used for stud purposes as long as possible. When purchasing a proven sire the chances of his begetting high-producing daughters are approximately 100 per cent.

Victoria Songbelle—576 lb. butter-fat; Champion Friesian cow, Melbourne Show, 1929.

Mr. E. P. Prentice, Mount Hope Farm, Williamstown, Massachusetts, U.S.A., some years ago realized that the only way to select a dairy bull was on the performance of his daughters, and, with the assistance of Dr. Goodale, he worked out an index of the sire's breeding ability. This is known as the Mount Hope Index*, and for several years now Mr. Prentice has been successfully employing this index as the basis of his breeding operations with his Guernsey cattle.

The Herd Sire, Victoria Joyous Mercedes; Champion, Melbourne Royal Show 1931, and 1933, and Res. Champion 1928, and 1930.

The Mount Hope index for a particular bull is obtained as follows:—

Compute the average "mature equivalent" of the milk production of all daughters of the bull, also the average "mature equivalent" of the milk production of the dams of these daughters, and take the difference between these averages. If the daughters' average exceed the dams' average, add three-sevenths of the difference to the daughters' average to get the bull's milk index figure. If the daughters' average is less than the dams' average, subtract seven-thirds of the difference from the daughters' average to get the bull's milk index figure.

The index for butter-fat percentage is obtained in a similar manner, but with different fractions. If the daughters' average butter-fat percentage exceeds the dams' average butter-fat percentage, add three-halves (or 1.5) of the difference to the daughters' average to get the bull's butter-fat percentage index. If the daughters' average is less than the dams' average, subtract two-thirds of the difference from the daughters' average to get the bull's index for butter-fat percentage.

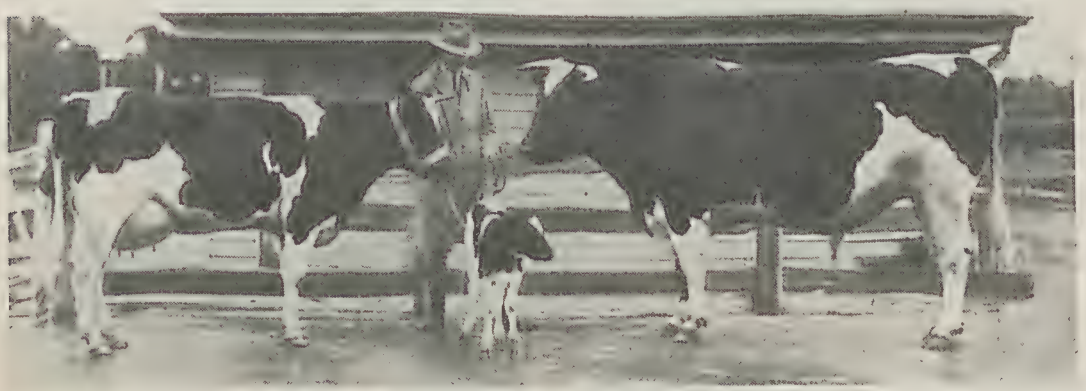
Multiply the milk index by the index for butter-fat percentage to obtain the bull's index for butter-fat.

This method of evaluating the herd sire is not accurate where the differences are small, and the accuracy increases as the number of dam-daughter pairs is increased.

The "Mature Equivalent."

To obtain the "mature equivalent" of milk production of a cow, each record is multiplied

(*) Quarterly Bulletin, The Imperial Bureau of Animal Genetics, Edinburgh. Vol. 1.



Three generations.—Victoria Joyous Mercedes (right), Victoria Meagre Mercedes (daughter), and Victoria Doubelle (grand daughter).

by a certain correction factor depending upon the age of the cow at the time of the test. All her corrected records are then averaged. This calculation is necessary since the yield of a cow increases with age up to a certain point, and it is only by correcting for age that comparable figures can be obtained. In this investigation correction factors as worked out by Dr Gowen* for the Friesian cattle of America have been used. These are shown in Table II. An insufficient number of cows in the Departmental Friesian Herd have records to give reliable correction factors.

TABLE II.—MILK CORRECTION FACTORS (GOWEN).

Age Years.	Correction Factor.	Age Years.	Correction Factor.
1·75	1,562	7·5	1·006
2	1,480	8	1·001
2·5	1,365	8·5	1·000
3	1,282	9	1·002
3·5	1,217	9·5	1·009
4	1,166	10	1·018
4·5	1,125	10·5	1·032
5	1,091	11	1·050
5·5	1,064	11·5	1·073
6	1,043	12	1·101
6·5	1,026	12·5	1·134
7	1,014	13	1·175

(*) "Milk Secretion," by J. W. Gowen: Baltimore: Williams Wilkins Co., 1924.

No correction is necessary for "test" or butter-fat percentage, because this factor shows very little variation with age, and any small variation is somewhat irregular. A heifer with a high butter-fat percentage will have a high butter-fat percentage as a cow, while a heifer with a low butter-fat percentage will always have a low test.

The average "mature equivalent" production of the 60 Friesian cows tested in the Departmental herd is 12,018 lb. milk, 3.63 test, and 435 lb. butter-fat.

THE MOUNT HOPE INDEX OF THE "VICTORIA" FRIESIAN SIRES.

The Mount Hope Index has been worked out for all the bulls used in the Departmental Friesian Herd at Werribee, and these indices are set out in Table III.

TABLE III.—THE MOUNT HOPE INDICES OF HERD SIRES USED IN THE "VICTORIA" STUD.

Sire.	Number of Dam-daughter Pairs.	Mount Hope Index.		
		Milk.	Butter-Fat Percentage.	Butter-Fat.
		lb.	%	lb.
Victoria Songboy ..	2	20,410	3·18	648
Victoria Patch ..	1	14,470	4·22	622
Victoria Joyous Mercedes ..	6	13,420	4·30	577
Dominion Woodcrest Piebe Mercedes ..	1	17,680	2·84	502
Victoria Jo Patch..	7	10,710	4·26	456
Dominion Oakdale	5	11,560	3·94	455
Victoria High Patch	2	12,070	3·75	452
Victoria Topnote ..	9	10,370	4·07	422
Victoria Old Dutch	1	11,190	3·61	403
Victoria Milkman Jo	3	11,580	3·42	396
Victoria Proud Patch	2	5,590	3·68	215
Dominion Domino Dutch Boy ..	9	4,060	3·68	149
Average ..	..	11,926	3·74	441

This table shows that seven of the twelve bulls have production indices higher than the average of the herd. These bulls, therefore, may be termed "proven sires." Unfortunately, the accuracy of these indices is low, because of the comparatively few daughters of some of the bulls. Nevertheless, the differences from the average are in most cases large, and this fact increases their significance. This inability to secure large numbers of animals to work with is a stumbling-block in all live-stock investigations.

Victoria Joyous Mercedes is the only bull shown in Table III. that is left in the Victoria Friesian stud. His production index is high, and his daughters to date have done well under test. His sire—Dominion Woodcrest Piebe Mercedes—also has a high production index. Victoria Joyous Mercedes has other daughters under test with incomplete records, and the indications are that their production will greatly exceed that of their dams.

Two of the bulls in Table III., namely, Victoria Joyous Mercedes and Dominion Domino Dutch Boy, have won championship prizes in the Melbourne Royal Show. The Mount Hope Index for Victoria Joyous Mercedes is 577 lb. butter-fat, while the index for Dominion Domino Dutch Boy is only 149 lb.

[Continued on page 518.

Overseas Gifts Scheme

Advertising Victorian Produce

IN pursuance of a belief that many Australians with friends and relatives in Great Britain would be glad to take advantage of an opportunity to forward at Christmas, Easter, or at any other time of the year, a present that would be of use to the recipient, and at the same time, a valuable advertisement for Victorian produce, the Department of Agriculture, six years ago, inaugurated a scheme under which arrangements were made to facilitate the forwarding overseas of presents of Victorian produce.

A PRESENT FROM VICTORIA.
THESE GOODS ARE PRODUCED IN VICTORIA BY BRITISHERS—MANY OF THEM RETURNED SOLDIERS.
BE BRITISH & BUY AUSTRALIAN PRODUCTS
FROM YOUR OWN KITH AND KIN FOR
AUSTRALIA IS BRITAIN'S SECOND LARGEST CUSTOMER.

Facsimile of Card enclosed with each Present.

As the suggestion for such a scheme was advanced towards the end of 1927, little time was available to put it into effect before the Christmas of that year, but nevertheless arrangements were made immediately for the acceptance of orders for presents for delivery in Great Britain by Christmas, and in the limited time at the disposal of the conveners, during which little publicity was possible, numerous orders were received, and a day or two before Christmas 1927, 232 cases of produce were delivered to many parts of England, Scotland, Wales, Ireland, and the Continent. So successful was this, under the circumstances, that it was thereupon resolved to make the scheme a permanent one.

When first constituted, the scheme included the forwarding of gifts to the Continent and the Irish Free State, but owing to the heavy customs dues levied by these places, presents for countries other than England, Scotland, Wales, and Northern Ireland are not now accepted.

In the year following the initiation of the scheme, orders for Christmas presents amounted to 1,045 cases. In 1929, 1,150 cases were sent, while in 1931 the number had increased to 4,005 cases, or 2,558 more than the number sent in the preceding year.

The scheme permits of presents being sent at any time of the year, and many Victorians have taken advantage of the opportunity to forward Easter and birthday gifts.

Since the scheme has been in operation, 10,359 orders have been received, and 11,818 cases of Victorian produce have been delivered to recipients overseas. These were made up of 2,669 cases of canned fruit, 1,587 cases of dried fruit, 651 cases of wine, 407 cases of jam, 863 carcasses of lamb, 539 boxes of butter, and 350 cases of apples and pears—which are available only during the export season—and 4,750 cases of mixed produce.

The scheme allows those desiring to send presents to friends in Britain at Christmas, Easter, and at any other time throughout the year, to send without trouble, and at a minimum of expense, choice quality samples of Victorian produce, such as fruit, wine, lamb, jam or butter.

The gifts available and the prices charged are as follow:—

	s.	d.
10 lb. choice butter	17	6
24 lb. assorted dried vine fruit ..	20	0
24 tins assorted canned fruit ..	25	0
1 carcass of prime lamb ..	25	0

	s.	d.
24 tins assorted jam	25	0
24 pint bottles of assorted wine ..	45	0
1 case mixed produce, consisting of 1 lb. butter, 3 lb. dried fruit, 3 tins canned fruit, and 3 tins jam	12	6
1 case of the above assortment, with the addition of 3 bottles of wine	18	6

Orders to forward any of these gifts to any address in England, Scotland, Wales, and Northern Ireland should be accompanied by remittances, and addressed to the Director of Agriculture, Treasury Gardens, Melbourne, C.2. Arrangements are made by the Department for delivery to the address given without any further expense than the amounts stated above, which cover cost of purchase of the goods, freight, and delivery charges.

The organization of the scheme at the London end is in the hands of the Trade Commissioner attached to the office of the Agent-General for Victoria. This official, on receipt of the list of orders from Victoria, writes a personal letter to each of the addressees, informing them of the nature of the present and the name of the donor, and asking if the date intended for delivery is suitable. This precaution is necessary, particularly when the present is of a perishable nature, and also to confirm the address and ensure safe delivery.

In each case of goods sent out, the Agent-General encloses an illustrated booklet entitled "Victoria, the Garden State of Australia," describing the industries associated with the exportable produce embodied in the scheme. In addition, an appeal to buy more Australian goods is inserted in each package. With the dried fruit gifts a copy of the dried fruit recipe-book issued by the Victorian Dried Fruits Board is included.

Herd Sires and the Mount Hope Index

(*Continued from page* 516)

butter-fat. This indicates the inconsistency of type as a guide to production.

Other methods of evaluating the herd sire have been worked out, and in most cases the results obtained by the different methods agree very closely. A method was devised and explained in this *Journal* in January, 1926, by Professor Agar, Professor of Zoology, University of Melbourne, who worked with the Red Poll herd that is maintained at the State Research Farm, Werribee, in conjunction with the Friesian stud. This method was adopted later by the writer in a revision of Professor Agar's work on the Red Poll stud which appeared in this *Journal* in February, 1932.

The Mount Hope Index can be applied to cows just as it is to bulls, and the cow with a high index will be one that is not only a high producer herself, but one that is transmitting her characters for high production to her daughters. In selecting dairy stock, therefore, preference should be given to those whose parents have high production indices, particularly in the selection of a young herd sire when a proven sire is unprocurable. It has been estimated that, when both the dam and the sire of this bull have high Mount Hope Production Indices, the chances of securing a bull that will beget high-producing daughters are at least 80 per cent. An animal that has one parent with a low index and one parent with a high index may be looked on as only a half-bred so far as production is concerned, and such animals should be avoided.

Mites in Seeds

Effects Investigated

By R. T. M. Pescott, M.Agr.Sc., Entomologist.

FOR many years, mites have been found in agricultural seeds imported into Victoria from overseas countries, though, apparently, not in sufficient numbers to cause any alarm. However, early in 1932 their numbers became so great, and their presence in imported seed so frequent that it was decided to investigate the matter with the object of determining whether the presence of the mites was in any way injurious to the seed. Experiments with that end in view were commenced late in 1932. The results of these experiments, which were carried out at the Plant Research Laboratory, Burnley, together with short references to overseas reports, are set out below.

Fig. 1.—Glyciphagus cadaverum Sch. × 80.

Historical.

The occurrence of mites in stored grain, flour, chaff, seeds, &c., has long been a matter of common knowledge. Several species of harmful mites have been involved, but all belong to the family *Tyroglyphidae,* popularly spoken of as Flour Mites. Other species of mites have also been found preying on these harmful species, but they are few in number. Where chaff, flour, and other farinaceous matter was concerned, severe damage has been reported, owing to the rapidity with which the mites are capable of multiplying. With seeds, one species particularly, *Aleurobius farinae,* De Geer, has been found responsible for severe damage at times, particularly to the embryos of seeds. Another species, *Glyciphagus cadaverum,* Schrank, has been found commonly in seeds, particularly in wheat, but so far has not been proved to be causing any damage to sound grain (1). In England, where *G. cadaverum* has been found associated with other species occurring commonly in flax seed, Davin (2) states that "None of the mites under discussion can attack healthy flax seed; they live only on broken seeds which in any case do not germinate. They also do no harm to plants when introduced into the soil with the seed. It was found that these mites cannot live in dry seed, and though the percentage of moisture required varies with the species, their presence may be regarded as a sign that the moisture content of the seed is dangerously high, its germination being seriously affected if it becomes damp."

Species Concerned.

An examination of the mites found associated with imported seed in Victoria showed the presence of three species of mites, namely:—*Glyciphagus cadaverum* Schrank, *Histiogaster entomophagus* Laboulbene, and *Cheyletes eruditus* Schrank (Fam. Cheyletidae).

Of these two, *Glyciphagus* and *Cheyletes* were found most commonly occurring in imported seeds, whilst *Histiogaster* was found only twice in very small numbers, and was not considered as of any importance in the mite infestation. It was later found that the mite *Cheyletes eruditus* was a predator on the species *Glyciphagus cadavcrum*, and, therefore, the problem resolved itself into whether the species *Glyciphagus cadaverum*, was capable of doing damage to agricultural seeds such as are imported into Victoria from overseas.

Fig. 2.—Cheyletes eruditus Sch. × 84.

Life Histories.

Following are brief summaries of the life histories of the two species of mites most commonly occurring:—

Glyciphagus cadaverum.—The adult female mite lays eight or ten smooth, narrowly oval eggs deep among the seeds. Under normal conditions, the eggs hatch in three or four days, to a larval mite possessing typically only six legs. After remaining in this state for six to ten days, the nymphal stage is reached, which lasts, roughly, 10–12 days. The adult mite then appears, and, providing food conditions are suitable, may remain alive for many weeks. If conditions become unsuitable, this mite is capable of producing a hypopal stage which is really a degraded type, but is capable of withstanding long periods of unfavorable conditions. It is partly by means of this stage that the mites are able to withstand extreme conditions, and also to be distributed.

Cheyletes eruditus.—This predaceous mite is characterized by the extraordinary development of the pedipalps (see Figure 2). The eggs of this mite are laid in batches of 20 or 30, usually on some portion of the seed, and egg laying occupies several days. These eggs hatch in approximately four days to the larval mite, which stays about 14 days in this state. In the nymphal condition, about 25 days are spent, the adult mite finally emerging after this period. It is usually about three to four weeks before the first eggs are laid by these adults.

Experiments have shown that the number of *Cheyletes* usually present in an infested sample of seed is not sufficient to prevent the rapid multiplication of *Glyciphagus* and thus only partial control is obtained by this mite.

Effect of Mites on Seed.

To determine whether there were any injurious effects on the seed as the result of the presence of the mites, two methods were used:—

1. To ascertain if there was any increase in the percentage of sievable matter in a "mitey" sample as compared with a "non-mitey" comparable sample.

2. To ascertain if there was any effect on the germination of a "mitey" sample of seed as compared with a "non-mitey" comparable sample.

To obtain information on these two points, 33 samples of seeds of varying types and

origins were obtained, and each sample was divided into three parts—known later as A, B, and C. *Sample "A"* consisted of clean seed stored under normal conditions of temperature and humidity. *Sample "B"* was seed stored under conditions most favourable to the development of mites, but without the addition of mites to the sample, and *Sample "C"* was seed stored under conditions most favourable to the development of mites, and with mites added to the sample.

At the end of a period of six months from the time of commencing the experiment, the samples were taken, each sieved separately with a 24 sieve (i.e., 24 meshes per inch), and both sieved seed and sievings weighed. In addition, 300 seeds from each sample were set out for germination tests.

The results obtained from these tests are set out in Table I. The type of seed and country of origin are shown in each case:—

TABLE I.

Sample.	Weight of Sieved Seed.	Weight of Sievings.	Percentage Sievings.	Percentage Germination.
	gms.	gms.		
Cocksfoot (Denmark).				
A	2·66	0·385	12·64	51·00
B	10·955	1·675	13·26	50·00
C	7·035	1·50	17·57	48·00
Irish Rye-grass (New Zealand).				
A	2·48	0·025	1·00	77·33
B	11·765	0·133	1·12	76·00
C	17·215	0·165	0·95	81·67
Canary Grass (Argentine).				
A	12·64	..	..	46·67
B	13·75	..	..	54·67
C	28·87	..	..	58·67
Cocksfoot (Denmark).				
A	2·765	0·025	0·89	63·67
B	12·56	0·115	0·90	71·33
C	10·78	0·105	0·97	51·00
Italian Rye-grass (U.K.).				
A	6·62	..	..	55·67
B	15·50	0·005	0·03	60·67
C	12·21	0·01	0·08	47·00
Rape (New Zealand).				
A	11·56	..	..	95·67
B	14·74	..	..	97·33
C	11·69	..	..	96·00
Rye-grass (New Zealand).				
A	9·63	0·005	0·05	78·33
B	21·00	0·015	0·07	77·00
C	13·13	0·01	0·07	74·00

TABLE I.—*continued.*

Sample.	Weight of Sieved Seed.	Weight of Sievings.	Percentage Sievings.	Percentage Germination.
	gms.	gms.		
Italian Rye-grass (Ireland).				
A	4·38	..	..	51·00
B	9·215	0·005	0·05	53·67
C	14·565	0·01	0·07	52·67
Kentucky Blue (New Zealand).				
A	12·37	..	..	9·67
B	9·44	..	..	10·67
C	8·93	..	..	7·00
Panicum (Queensland).				
A	10·275	0·025	0·24	75·33
B	22·70	0·03	0·13	65·00
C	30·165	0·04	0·13	72·67
Kentucky Blue (New Zealand).				
A	8·46	..	..	10·67
B	13·29	..	..	7·00
C	7·64	..	..	7·33
Irish Rye (U.K.).				
A	9·60	0·005	0·06	71·00
B	10·72	..	0·00	73·33
C	11·49	0·01	0·09	67·67
Irish Rye.				
A	9·37	..	..	86·00
B	9·79	0·005	0·05	92·33
C	14·64	0·035	0·24	89·33
Rye-grass (New Zealand).				
A	8·77	0·005	0·06	85·33
B	7·46	0·01	0·13	85·00
C	5·39	0·01	0·19	86·33
Italian Rye-grass (U.K.).				
A	7·46	..	..	89·00
B	8·38	0·005	0·06	90·00
C	4·79	0·015	0·31	90·67
Turnip (New Zealand).				
A	7·16	0·005	0·07	19·67
B	8·45	0·01	0·12	25·33
C	6·39	0·01	0·16	27·33
Cocksfoot (New Zealand).				
A	2·625	0·03	0·01	17·00
B	4·75	0·185	3·75	16·00
C	3·32	0·34	9·29	16·00
Italian Rye-grass (New Zealand).				
A	5·82	0·005	0·09	74·00
B	15·87	0·02	0·13	79·33
C	11·75	0·02	0·17	67·33
Irish Rye (U.K.).				
A	8·85	0·05	0·56	73·33
B	16·83	0·005	0·03	82·00
C	16·94	0·01	0·06	83·00

TABLE I.—*continued.*

Sample.	Weight of Sieved Seed.	Weight of Sievings.	Percentage Sievings.	Percentage Germination
	(gms.)	(gms.)		
Italian Rye (Ireland).				
A	8·75	..	..	50·67
B	10·47	0·005	0·05	58·00
C	8·94	0·005	0·05	43·33
Canary Seed (Argentine).				
A	10·44	..	..	76·00
B	12·37	0·005	0·04	85·00
C	9·49	0·005	0·05	77·33
Panicum (Queensland).				
A	15·85	0·015	0·09	68·33
B	16·47	0·015	0·09	64·67
C	14·39	0·07	0·48	67·00
Italian Rye-grass (U.K.).				
A	7·99	0·005	0·06	85·00
B	13·37	0·01	0·07	83·33
C	12·49	0·01	0·08	80·00
Crested Dogstail (New Zealand).				
A	..	..	..	58·33
B	..	..	..	54·06
C	..	..	..	51·33
Irish Rye-grass (U.K.).				
A	7·62	..	..	72·00
B	6·49	0·005	0·08	85·00
C	5·78	0·005	0·09	85·67
Rape (U.K.).				
A	16·61	0·005	0·03	89·33
B	14·28	0·005	0·03	87·00
C	13·79	0·005	0·04	92·33
Irish Rye-grass (U.K.).				
A	11·74	0·005	0·04	83·33
B	8·79	0·005	0·05	90·33
C	8·48	0·005	0·06	90·67
Cocksfoot (Denmark).				
A	8·73	0·045	0·51	63·67
B	9·87	0·06	0·60	53·33
C	9·29	0·05	0·53	81·00
Irish Rye-grass (U.K.).				
A	7·47	..	..	77·33
B	8·81	..	..	91·00
C	8·14	..	..	91·00
Cummin Seed (Queensland).				
A	9·37	0·20	2·09	32·00
B	15·37	0·30	1·92	31·00
C	16·16	0·21	1·28	33·33
Irish Rye-grass (Denmark).				
A	7·41	0·005	0·07	82·33
B	7·27	0·005	0·07	87·33
C	6·99	0·005	0·07	82·67

Owing to the fact that facilities for the germination of Brown Top were not available, the figures for this grass seed are not available. However, mites have never been found by the quarantine officers in Brown Top, so that so far as this grass is concerned the problem does not exist.

The results of these tests are summarized in Table II.

TABLE II.

Summary of Seeds Concerned.

—	Percentage Sievings.	Percentage Germination.
Irish Rye-grass—		
Sample A	0·22	77·83
„ B	0·18	84·66
„ C	0·17	83·96
Cocksfoot—		
Sample A	0·47	48·11
„ B	1·75	46·89
„ C	3·60	49·33
Canary Grass—		
Sample A	0·00	61·33
„ B	0·02	69·83
„ C	0·02	68·00
Rape—		
Sample A	0·01	92·50
„ B	0·01	92·17
„ C	0·02	94·17
Rye-grass—		
Sample A	0·06	81·83
„ B	0·10	81·00
„ C	0·13	80·16
Italian Rye-grass—		
Sample A	0·03	69·93
„ B	0·07	72·87
„ C	0·14	60·80
Kentucky Blue—		
Sample A	0·00	10·17
„ B	0·00	8·83
„ C	0·00	7·16
Panicum—		
Sample A	0·16	71·83
„ B	0·11	64·83
„ C	0·30	69·83
Crested Dogstail—		
Sample A	0·00	58·33
„ B	0·00	54·00
„ C	0·00	51·33
Turnip—		
Sample A	0·07	19·67
„ B	0·12	25·33
„ C	0·16	27·33

In every case, after the weights of sievable materials were obtained, a microscopical examination was made of sievings from samples A, B, and C, and it was found that, whereas samples A and B showed approximately similar texture, the material in sample C was of a very much

finer texture, showing that some kind of disintegration had taken place. As the mites in sample C represented the only difference between samples B and C, it must be assumed that they were responsible for this breaking down.

Consideration of the germination figures shows that there is very little difference between samples B and C except in the case of Italian rye-grass and Kentucky Blue, where there is a definite reduction amounting to 16.6 per cent. in the case of Italian rye and 18.9 per cent. in the case of Kentucky Blue, when sample C is compared with sample B.

From the above figures, it seems clear that little, if any, damage is done to Irish rye-grass, Cocksfoot, Canary Grass, Rape, Rye-grass, Panicum, Crested Dogstail, and Turnip by the mite *Glyciphagus cadaverum* when present in large numbers, but that definite injury results to Italian Rye-grass and Kentucky Blue. In all seeds, there is, generally speaking, a slight increase in the percentage of sievable matter in sample C over sample B. It seems, therefore, the mites have further broken down in these cases, broken grain which, before the mites were introduced, were retained by the sieve, since the germinations are very little affected.

The experiments appear to indicate, therefore, that some seeds are susceptible to the attacks of mites, the results of their activities being a definite lowering of the germination power of the seed. With other seeds there is little or no effect on the germination of the seed, but a slight increase in the percentage of sievable matter, which is probably represented by the breaking down by mites of already broken seeds in the sample. It seems fairly definite from a study of the sievings in the various cases, that the mites live essentially on broken grains, glumes, and other inert matter in the sample, and only, in certain cases, are they capable of attacking sound germinable grains to such an extent as to have any injurious effects on these grains.

REFERENCES.

1. Newstead and Duvall, Bionomic Morphological and Economic Report on the Acarids of Stored Grain and Flour. Reports of the Grain Pests (War) Committee No. 2, 1918.
2. Davin, Infestation of Flax Seeds by Mites. Linen Ind. Res. Ass. Res. Inst. Mem. 31, Jan., 1926.

POSTAL DISTRICT SYMBOLS

The postal district system was introduced by the Postal Department some five years ago to expedite delivery of articles addressed to Melbourne and suburbs. Much publicity has been given to the scheme, but it is not being utilized to the extent desired by the Department, recent records showing that on only about 60 per cent. of the mail matter addressed to Melbourne and suburbs is the appropriate postal district symbol included in the address. The Postal Department wishes to emphasize that the postal district scheme was inaugurated with the sole object of assisting in the prompt delivery of mail matter addressed to Melbourne and suburbs, and is making this further appeal to the public to make use of the system, irrespective of whether the volume of correspondence sent through the post individually is large or small. The inclusion of the postal district symbols in the address of correspondence is of great value to the sorters at the General Post Office, as it indicates to them the particular office to which the letters should be forwarded to ensure prompt delivery. As an example to illustrate the difficulty confronting the General Post office sorters, it might be mentioned that letters for Gardenvale may be delivered from the post offices at Elsternwick, Brighton, or Elwood, according to the particular part of Gardenvale for which the articles are intended. The Department is hopeful that this appeal will be largely responded to by the public.

Coulure of the Grape Crop

Abscission or Shelling

By F. de Castella, Viticulturist

IN certain seasons the early indications of an abundant vintage, given by the numerous inflorescences on the sprouting vine, fail to materialize. There is a fine "show of fruit" in September, but this promise is not realized when vintage comes round, the flower buds, in varying proportion and at different stages of development, withering and falling from the vine.

This accident—for it cannot be called a disease—is what is known by the French term "Coulure," a convenient word that has been adopted in South Africa and California for want of an exact English equivalent.* It is sometimes referred to as non-setting of blossom, but the term is not always appropriate, since in many cases the flowers set quite well, but the young berries drop subsequently. The term is derived from the verb "couler," to run or flow; it also means to leak. It is certainly equivalent to a serious leakage in the wine yield.

Coulure is a general term, that applies to all the different forms; it includes failure of the flower at blossom, or even before it, as well as the dropping of the young berries after they have set.

Let us not forget that the majority of the flower buds on any bunch are doomed to fail. Nature provides them over-lavishly, and it would be quite impossible for them all to ripen. Some bunches carry, before blossom, well over 1,000 flower buds; at vintage time a ripe bunch with 100 berries is a fair-sized one. A drop of about 80 per cent. is thus normal, and indeed desirable. It is only when this figure is considerably exceeded—when whole bunches, or important portions thereof, are shed—that yield suffers.

The Mechanism of Coulure.

It has long been recognized that bad weather is the chief cause of coulure, which is much less in evidence when fine weather prevails during blossom. Pollen grains burst in water; it is only in the viscid secretion of the stigma that they germinate normally and form a pollen tube. Prolonged rain literally washes out the flowers which fail to set, and die. Even with less drastic conditions and at a later period, dropping at various stages may severely reduce the grape crop. The injury then occurs in a somewhat different manner, viz., by abscission, or the formation of a separating or isolating zone or layer, in stalk, stalklet, or pedicel, so weakening their attachment that bunch, bunchlet, or berry, or even flower bud, if before blossom, is shed or dropped from the vine. A livid ring appears on the supporting organ, and at this point portions of bunches, or even whole bunches, dis-articulate and fall off. The mechanism of this occurrence is on very similar lines to the fall of the leaves of deciduous plants at the end of autumn. Abscission may take place at any time, from before blossom until the berries are three-sixteenths of an inch in diameter; later than this they are fairly safe.

It is worthy of note that thrips is nearly always blamed for this berry drop, for which it is seldom, if ever, responsible. The vine flower is radically different from that of the apple and other fruit trees, so susceptible to this insect. Though the vine is possibly not immune, the cases of coulure that have come under my notice have invariably been due to other causes.

There are, however, other forms of coulure. It may be due to faulty constitution of the floral organs; the pollen may be at fault; inter-pollination then becomes desirable. There is also that allied form, known here as "hen and chickens," to which the special term "Millerandage" is given in France, and "Shot berry" in California. It is frequent with Raisin des Dames and not uncommon with Waltham Cross, and even Gordo Blanco.

* The term "Shelling" is often applied to the dropping of berries in America.

The bunch ultimately consists of a few large berries and a good many small seedless ones, which seem to have been only partially fertilized, whereas the large ones were normally so. Inter-pollination mitigates this defect, if it does not altogether prevent it.

Seedless grapes, such as Sultana and Zante Currant, are really in similar case to these small berries. The blossoms seem to be fertilized, even if incompletely so. These also are liable to coulure, of the usual abscission type.

The Causes of Abscission.

According to Merjanien,* a recent Russian investigator, the separating zone is the result of an insufficient flow of substances assimilated by the leaves, or Photosynthates, towards the bunches; in other words, to nutrition troubles.† Atmospheric humidity increases coulure by favouring the formation of the separation zone —also by increasing the turgescence of the stalk tissues and by reducing sap concentration. Commenting on this opinion, Ravaz points out that a moist atmosphere means cloudy days, when lack of sunlight impedes assimilation. Transpiration being also reduced, sap is more dilute; in other words, high sap pressure, but low concentration. Physiologists may differ concerning this last point; but, whether this opinion be correct or not, we know that abscission often follows drastic weather changes, such as a cold spell after mild, warm weather. The young fruit seems to get a chill just as humans do. Under such circumstances, transpiration and leaf assimilation slow down, as pointed out by Ravaz.

Under-nutrition of the young bunches may also result from the competition of other parts of the vine—chiefly the growing tips of the shoots, but also of the other bunches, in cases where these are more numerous than the vine can adequately nourish. The competition of the growing tip is, perhaps, the most common cause. The greater the vegetative vigour of the vine, the more serious is this competition. In other branches of horticulture it is recognized that, in cases where there is scarcity of water or photosynthates, it is the young fruit that soonest feels the pinch; the new growth seems to have first call. In the elimination of this competition, by removing the tip, we have a means of countering the trouble. The competition of the too numerous bunches can likewise be countered by bunch control before blossom.

Fortunately, it is only in occasional seasons that these accidents occur. When such a season comes round, all vine sorts are not equally affected. Some suffer little, if at all, whilst others are much more susceptible. Among the latter each one seems to have its special period of susceptibility, and, if this fits in with a weather disturbance, that sort may suffer alone. In one season there may be unusual dropping of sultana berries; in another it may be only currants that are affected.

Aggravating Factors.

Exuberant vegetative growth is often at fault; over-vigorous vines are more prone to set their fruit badly than those of moderate growth. It is often stated that such vines "run to wood" instead of forming fruit. Too rich a soil and excessive application of nitrogenous manures render vines more liable to coulure in seasons climatically suited to its occurrence. With grafted vines the stock also may have an undesirable influence. Those that promote very strong growth should be avoided for doubtful "setters." At Rutherglen the case of Malbeck grafted on Rupestris du Lot is only too familiar. Affinity is excellent, growth and show of fruit are very promising, but the last mostly disappears at blossom, only a few badly-filled bunches remaining at vintage time.

Injudicious irrigation, such as promotes an undue activity of growth at or near blossom, may have a similar effect. On the other hand, vines must not be allowed to approach the wilting point at this time. It is curious that insufficient moisture may lead to a similar result. I have known cases where the dropping of sultana berries in December, when the size of large shot, was definitely due to deficient soil moisture.

Similarly with fertilizers—though over-feeding, especially with nitrogen, is undesirable, the other extreme is equally so. Vines starved for want of manure often set badly. Potash and phosphoric acid are generally held to favour setting, but nitrogen can have a similar beneficial influence in soils deficient in this essential plant food.

Remedial and Preventive Measures.

How can the vine-grower assist setting? Obviously, he cannot alter unfavorable weather; against a literal washout of the

* M. Merjanien, Director of the Viticultural Station at Anapa, Southern Russia, at the extreme west of the Caucasus Mountains.
† Experiments are described in support. Severed vine canes bearing inflorescences, the cut ends of which were placed in water, soon showed characteristic COULURE; if placed in 5 per cent. glucose solution, coulure did not ensue. Cincturing the main stalk of an inflorescence, or the cane above and below its insertion, also resulted in coulure, due to the cutting off of supplies from the leaves.

flowers he is powerless. But there are several directions in which he can take action to very good purpose. Conditions must be aimed at that improve in the greatest measure possible the nutrition of the recently-formed fruit. A given operation will not suit every case, but there are several lines of treatment that have a mitigating tendency at critical periods, which may lead to a quite notable improvement. These are summer pruning operations, such as topping, cincturing, and bunch control; reduced irrigation in spring, sulphuring and potassic manuring.

Half of Sultana Vine at early topping Stage.

Topping has long been looked upon as a very effective means of combating coulure. It acts by eliminating the competition of the growing tip, which, as we have seen, is one of the chief causes of the trouble.

Summer pruning is, however, a two-edged sword—its weakening effect is well known. On moderately-growing vines it is unnecessary and, indeed, undesirable, but on vines that have been heavily manured and copiously irrigated, with the result that they are making too exuberant growth, its weakening effect is of no consequence to the vine, whilst its value in preventing abscission may be very real.

"Stopping" or "tipping" is to be preferred to topping—at least, five leaves should be retained above the uppermost bunch. This operation must be judiciously timed; otherwise it will be ineffective. The growing tip must be suppressed at, or shortly before, the moment when its competition would prove harmful. If too early, laterals will be forced out, thus providing new growing tips, to again compete, and, may be, at the critical moment. The best time varies, of course, according to the form of coulure; that is expected. Against failure of the flower, topping at, or just before, blossom is needed. Against a later dropping of berries it should be executed somewhat later.

The illustration shows one-half of a sultana vine, trained in the usual manner of our irrigation districts, in late October, just before the moment for the earlier form of topping to prevent coulure. The inflorescences are about to blossom. Topping, or rather tipping, will suppress the terminal 3 or 4 inches only. It should be confined to the fruiting shoots (centre and right of photograph) and not be applied, at this stage, to what will be the pruning wood (left) growing near the crown of the vine. The check given to the former will benefit the latter, and make the canes more eligible as "rods" for the following season.

A few weeks later the pruning wood itself may be lightly topped, but only in the case of very exuberant growth; the rods will thereby be rendered more fruitful.

If coulure of the "berry drop" type is feared, some time after blossom, topping should be applied a few weeks later than the stage shown in the photograph, but in quite similar manner.

Cincturing certainly has a potent action. It effectually prevents abscission in the case of the Zante Currant, to which it has long been regularly applied, during or shortly after blossom. Without it, this now very fertile sort would not be profitable. The vigorous Zante Currant tolerates this rather brutal yearly treatment of its main trunk without inconvenience. After 40 years it shows scarcely any signs of weakening. Not so the sultana, which is usually affected adversely after a year or two. Though berry size is increased and bunches are better filled, quality suffers and injury by

mould is more severe. Cincturing rather increases liability of some table grapes to "hen and chicken" setting. Though it prevents abscission, the proportion of small seedless berries is increased. This effect is very marked with Raisin des Dames. Cincturing is chiefly of value for the Zante, which is a seedless grape.

Bunch control often corrects coulure of free-bearing sorts, such as Gordo, which sprout more bunches in spring than the vine can properly ripen. Coulure is nature's relief of the overburdened vine, but straggly, unmarketable bunches and small berries inevitably result. Coulure is here the direct result of competition between the too numerous bunches. Their reduction, either by hard pruning or, better, by deliberate thinning, before blossom, is the obvious remedy. Bunch control of Gordo is very effectual; good quality table fruit can scarcely be expected without it. It is sometimes beneficial to the currant; less so to the sultana, which is not over-lavish with its inflorescences in early spring.

Withholding irrigation in October and early November results in more moderate, tougher, and less watery growth; according to Merjanien's explanation, it would mean higher sap concentration and better bunch nutrition, conditions that reduce the risk of coulure. Such practice is only safe if the season be started with sufficient moisture reserves in soil and sub-soil. The wilting point must on no account be approached, since it also may result in abscission.

Watering in October and November is generally unnecessary. It is usually applied because of fears that, without it, the vine cannot carry on until water is again made available. The soil auger is of great value to show whether water is needed or otherwise, and to give an idea as to how long the vines can carry over without it. To again quote Merjanien, "Bunch starvation may occur if too much water is sent up by the roots. . . . The ratio between photosynthates and the water content of the stalk probably plays a dominant part in abscission and coulure."

Sulphuring while the vine is in full bloom is considered by all viticultural authorities to favour setting, though its mode of action in this desirable direction is not understood.* Sulphur dustings constitute the standard treatment for oidium control, but they exert a decided tonic action, intensifying the green of the foliage and, if repeated three or four times during summer, appreciably advancing the ripening of the grapes. Sulphuring is thus well worth while, even if there is no oidium—as a matter of fact, this fungus often does more harm to the quality of the fruit than is realized. Sulphur also controls erinose, caused by a mite that is sometimes prevalent in our vineyards.

Potassic manuring should help materially. Its well-known action, in increasing the efficiency of the foliage, should supplement the available supply of photosynthates, so as to meet all the vine's requirements at the critical time. In France, indeed, potash is looked upon as a specific against coulure. The vine takes its potash from the soil at two different growth periods, viz., early spring and late summer. As the first of these absorptions only can help against coulure, potash, to be of use in this way, should be applied before the vines sprout. Many Australian soils are well supplied with potash. On such it would seem open to question whether further additions could effect much benefit.

Lagatu's recent investigations at Montpellier (France) indicate the need for proper balance in manure formulae, which would be just as necessary for the vine as is a properly-balanced ration for a dairy cow.

* For further information concerning the beneficial effect of sulphuring, see Bulletin 50, Department of Agriculture.

Mastitis of Dairy Cows

Compiled by the Veterinary Staff, Department of Agriculture.

MASTITIS, which is known also as Mammitis and Garget, is an inflammation of the udder, caused by specific organisms visible only under the microscope. The disease is contagious, that is, the causal organism may be readily transferred from one individual to another by direct or indirect contact. In the case of mastitis, the means of infecting cows are indirect, as, for instance, by the hands of milkers, and by the cups of milking machines.

Mastitis organisms have an important influence on the keeping qualities of milk, and the question of their effect on the health of human beings, more particularly on that of children, is certainly one to be considered.

Causes.

The organisms responsible for the greater number of cases of this condition are *streptococci* and *staphylococci,* but isolated cases and outbreaks occasionally are due to other organisms.

Mastitis caused by the *streptococcus* is more common and, as a rule, the source of infection in an outbreak is the udder of a cow from which the organisms pass out in the milk.

These organisms may lodge in dirt around cow yards and milking sheds; they may be carried in dust, and are frequently present on the hair and skin of animals.

There are often contributory causes which allow the causal organism to overcome the natural resistance of the animal to infection. Among these are bruising the udder; unnatural retention of milk when cows are stocked up, or when they are being carelessly dried off; and, finally, the sudden change in a cow's udder that takes place when she "comes in," that is its change from a non-secreting to a secreting organ.

Mode of Infection.

Unfortunately cows may be very easily infected with the mastitis organisms. A cow's udder is in direct communication with the outside of the animal body. When not being milked, the teat by means of muscular contraction is closed, but even then is not impervious to the entrance of germs. When milking commences there is a relaxation of the teat muscles thereby providing a more patent passage for the entrance of the disease producing germs.

In general, then, infection takes place through the teat. Infection, however, may also pass directly into the udder tissue by means of injuries and contusions caused by kicks—from man as well as other animals—by horning, and by wire cuts. In these cases the infection may be caused by several different organisms, but nevertheless quite capable of being transferred to other cows.

Once the causal organism gains entrance to the udder, it finds in this organ an ideal medium in which to develop and multiply.

Symptoms and Diagnosis.

Most dairy farmers are conversant with the symptoms of mastitis, and readily diagnose it, more especially when it has reached the stage where the milk has undergone extreme change. Then one can scarcely help recognizing it. What is of greater moment is ability to recognize the onset of the disease, and to realize the fact that even mild cases are contagious, and are apt to turn into chronic cases very soon after the most noticeable symptom—the abnormal appearance of the milk—appears.

A great deal depends on the virulence or strength of the causal organism, but usually at the onset a change is noticed in one or more quarters, which may become inflamed, hot to the touch, swollen, and painful.

The cow may "go off" its feed, and investigation will show that the temperature is above normal—a cow's normal temperature being from 100 deg. to 102 deg. Fahr.

The milk secretion is diminished and soon changes in appearance; small clots appear in it; perhaps it is tinged with blood, or it may appear watery. Later on the clotted material

increases, and the whole of the secretion may become thick and purulent or pus-like.

After the disease has progressed for some time, structural alterations take place; the affected quarters become thickened with fibrous tissue throughout their substance, and often series of knotted cords can be felt.

Naturally, when the secretion becomes thick as a result of pus formation and clotting, greater difficulty is experienced in "stripping-out" this discharge, and the condition may then bring about the formation of abscesses which will point and break to the outside.

In some cases in which constitutional disturbances—high fever and loss of appetite—occur at the outset, the udder becomes highly inflamed and livid in appearance and though not more than one quarter may be affected at first, before long the trouble may spread to all four quarters. This signifies that gangrene has occurred, and the affected portions of the udder may die and drop off. Such cases may terminate fatally.

All cases of mastitis should be treated as contagious. Even if the alteration in the milk be only slight, vigilance and care must not be relaxed. These mild cases of a chronic nature are occasionally treated lightly by the dairy farmer. Probably all that is noticed is a slight swelling of the udder, or part thereof, lasting only a few hours, and accompanied by a slight watery appearance of the milk, in which may appear small clots—a condition to which the term "stringy milk" is given.

These symptoms may disappear by the time of the next lactation, and perhaps it will be thought that the cow has recovered. But this is not always so, and frequently the milk remains infective. After a time the tissue of the quarter undergoes alteration, and, on manual examination, distinct thickening can often be felt, and the quarter may become light in milk secretion. From time to time in these chronic cases the milk may appear stringy or watery, but in such a mild way that any change is overlooked. A serious recurrence is likely to occur at the next calving.

It is necessary for all dairy farmers to recognize that this mild form is one of contagious mastitis, and to treat it as seriously as the more acute form. Only by a bacteriological examination can it be ascertained whether milk is non-infective. Such an examination will be made by departmental officers on request.

Treatment.

Treatment presents many difficulties. If one could only tell at the onset whether complete recovery was likely, one would naturally be justified in going to considerable trouble to attain this. Unfortunately, many apparently slight cases prove obstinate, and even when eventually the milk may appear normal to the eye once more, the udder has become nodular or fibrosed, and complete recovery has not taken place. In such instances, mastitis organisms may still be present in the apparently normal milk.

It is advisable to isolate, where practicable, the affected cows, and the time to carry this out, and also the time to commence treatment, is right at the onset of the complaint.

Commence treatment as soon as any abnormality of a quarter, or of the secretion, is noticed. Do not wait to see how it will be at the next milking; such a delay may mean the difference between a speedy cure and a protracted case or a non-cure.

If taken in this very early period, rubbing the quarter affected with some stimulant, such as camphorated oil, twice a day, in combination with the practice of "stripping out" the quarter as many times as can be carried out under the conditions, may be all that is necessary to effect a cure, and prevent the case reaching the stage where pus forms and the milk becomes thick.

A drench consisting of 1 lb. of Epsom salts and a cupful of treacle in a quart of warm water is advisable, especially if the cow shows any inconvenience, or a rise in temperature.

If the case advances in severity fomentation and massage should be adopted. Fomentation is best carried out by two persons. A dish of water as hot as can be borne conveniently by the hand should be placed under the udder. A large cloth should be dipped in this and then held against the udder. In order to keep the water at the right temperature, hot water should be added at intervals.

Massage should be continued for ten or fifteen minutes, after which the contents of the udder, often little else than pus, could be removed by stripping. The treatment should be repeated frequently throughout the day, the massage being facilitated by the use of a liniment, or by a lubricant such as olive oil.

Means of Spread.

In most outbreaks of mastitis, carelessness and ignorance on the part of the owner and attendants are the cause of spreading it from one cow to another.

The chief means of spread of the infection are as follow:—

By the hands and clothing of milkers.
By milking machines being used on affected cows.
By introduction into teats of non-sterilized instruments.
By germ-laden dust, &c., lodging on the udder, especially at or about milking time.

Clean farms and herds invariably become infected by the introduction of a diseased cow, which, in the case of streptococcic mastitis, is the original source of infection from which, by some of the above-stated means, other cows become infected.

Control.

Dairy hygiene, if practised correctly, will minimize the spread of mastitis. Cleanliness in every process is essential. The milking sheds should be well situated on high grounds, should have impervious floors, and the yard immediately adjacent to the shed should be pitched. Where a water supply can be used, both shed and yard can be cleansed by flushing. The sheds should be cleaned out regularly, and must not be used for storing bags, skins, harness, &c. White-washing and tarring should be regular practices.

Prior to milking, the udders and teats should be washed with soap and water, and then dried with a clean cloth. The hind legs must be kept clean, and the hair of the flank clipped when necessary.

Water for washing the udder should be changed frequently, and cloths should be clean. A number of cloths should be kept for this purpose, and they should be boiled daily.

A separate dish and towel should be kept for the use of milkers, whose hands should be washed immediately prior to milking each cow.

Dry milking is to be preferred.

Milking machines must be kept scrupulously clean. The use of scalding water and soda is advisable. A leaflet on this subject can be had from the Department of Agriculture.

Before affixing teat cups to the udder, each quarter should be tested by milking a little from each into a special bucket.

Never milk on to the floor.

Should a cow affected with mastitis be discovered after machines have been used on her, the hot soda solution should be run through them to clean them before they are used on another cow. Immediately a case is noticed the cow should be removed from the shed until the remainder of the herd is milked. If strict isolation is impracticable, the affected cow should be brought into the yard after the healthy cows have been let out. A separate bail, preferably outside the shed, should be used for these cases, and on no account should machines be used on them. An instance has been recorded in this State where, through the use of machines on a cow affected with mastitis, a herd of 80 cows became infected to such an extent that the entire herd was ultimately turned into beef.

Where the cow is a low producer, and especially where this is combined with the fact that she is of a beef type, no time should be lost in drying her off, and fattening her. Little or no monetary loss will be incurred, and the action may prevent further infection.

During treatment of cases, all the infected milk should be collected into special containers such as petrol tins, and should be boiled before being discarded.

Cases of mastitis often occur after teat instruments are used. To prevent this happening, the instruments should be sterilized by boiling in water for ten minutes.

Finally all newly-purchased cows should be isolated for a few days, or, at any rate, they should be milked last, and an examination made of their milk to see that there are no indications of mastitis.

Vaccination should not be undertaken without the consent of the Department of Agriculture.

The Cultivation of Herbs

(*Continued from page 497*).

The price varies a good deal according to demand for and quality of the oil, but 18s. to 22s. per lb. is a good average price in Australia.

If lavender is grown under suitable conditions, it does not appear to be troubled by any serious diseases or pests, but if the soil is not well drained and well supplied with lime, the roots may be attacked by fungi when the plant soon succumbs.

Kerosene as a Drench for Cattle

Dangers of its Use

By R. N. Wardle, B.V.Sc., Veterinary Officer

THROUGHOUT the dairying districts, one is constantly coming in contact with cattle owners who make use of ordinary illuminating kerosene as a drench, in cases of illness in their stock. They frequently use it for hoven or bloat, and in numerous instances for impaction, while it is often given to sick animals when no definite diagnosis has been made. The dose used varies from a cupful to a pint.

As far as can be ascertained, kerosene has no medicinal action not obtainable by the use of safer remedies.

From statements of users of kerosene for stock drenches, it would appear that in cases of bloat its administration causes gas to be eructated or expelled by the mouth, while, in cases of impaction, the purging action of the agent frequently has the desired effect. Thus, while it would seem that there is some justification in using such a drench in the ailments mentioned above, there certainly is no reason to justify its use in cases of non-diagnosed illnesses.

In many reported cases of the use of this medicament, the animal has died, and in a large percentage of those on which autopsies have been made, intestinal irritation and pneumonia have been evident. The pneumonia has been attributed invariably to the fact that some of the drench has "gone the wrong way," that is, has passed down the trachea or wind-pipe; but in view of the results of experiments on sheep conducted by H. R. Seddon, D.V.Sc., and C. Blumer, B.V.Sc., in New South Wales, it is now considered that the pneumonia is a natural sequel to drenching with kerosene.

In these experiments it was ascertained that 2-oz. doses of kerosene were toxic to sheep. Post-mortem examination showed intestinal irritation and an acute pleurisy and pneumonia which were not caused by the entrance of the drench into the trachea. In these experimental cases and also in our experiences with cattle there is a distinct smell of kerosene throughout the carcass.

Although it is not suggested that the death of every beast that has been given kerosene during its illness is attributable to the drench, it is reasonable to conclude that, in these cases, in the absence of a post-mortem finding consistent with the illness from which the beast suffered, the presence of a pneumonia and of intestinal irritation together with certain other data obtained from the later symptoms, can be used to attribute the cause of death to the drench.

In the carcasses of cows which reach certain boiling-down works, the presence of discernible quantities of kerosene in the stomach and intestines and of its characteristic smell in the lungs, is so common that evidence against this medicament as a drench tends to increase.

Although it is known that some cattle-owners obtain effective results by the use of kerosene in cases of bloat and impaction, it would appear that many more have experienced bad results. Evidence shows that, used internally, kerosene is unreliable and dangerous, therefore the following warnings are given:—

(1) Think well before giving kerosene internally.

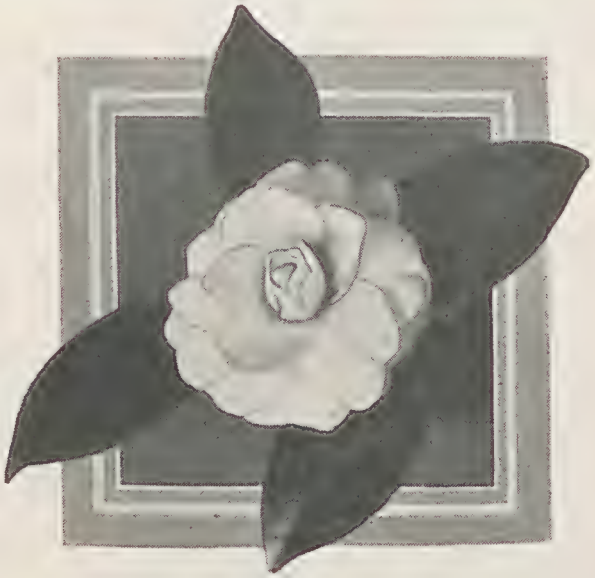
(2) Do not confuse kerosene with liquid paraffin, which is a safe medicament.

(3) If it is desired to use kerosene internally for cattle, make the maximum dose 6 oz.

(4) It is less likely to have ill effects if given in milk than if given neat or in water.

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.



Camellia.

The Flower Garden.

OCTOBER is one of the busiest months in the gardener's year. Seeds of all summer annuals are to be sown, and early seedlings transplanted. Herbaceous plants are to be set out, summer and autumn flowering bulbs planted, roses watched for mildew and aphis, and spring flowering shrubs pruned after flowering.

The correct time to prune a flowering shrub is immediately after flowering. But it is not always necessary to prune every shrub. If the plant is thriving, shapely, not overgrown, and producing enough flowering wood, it does not require pruning. Certain shrubs that produce a mass of wood, filling up the centre with leafless, unproductive stems, should have the centres cleaned out periodically so as to let in light and air.

The cobwebs of nest-building spiders should be cleaned out of the inside of shrubs. These spiders are a considerable pest in northern areas, especially in holly bushes. A strong oil spray should be applied to the cobwebs, thoroughly drenching each one.

Mildew of the rose appears as a fine grey powdery deposit on the young shoots, causing them to shrivel and die quickly. When this disease appears, sulphur should be dusted over the plant and on the soil. Rose aphis should be sprayed regularly with nicotine sulphate.

The Vegetable Garden.

Special beds, composed of rich friable soil, should be made for crops of sweet corn and sweet pepper. These are two summer crops which thrive in a sunny spot in the garden. In addition to a rich soil they must have ample water. As the sweet corn grows, the soil should be heaped around the stems to provide an additional root system from the leaf nodes.

It is not necessary to stake tomato plants, unless they are in a wet spot in the garden. Experiments by the Department of Agriculture at Bendigo proved that unstaked plots gave results equally as good as those from the staked plants. At the same time, in a small garden plot, where intense culture is carried out, and where much watering and manure are given, staking is advisable

The Orchard.

The calyx spray of arsenate of lead for codling moth must not be delayed. This should be followed by a second spraying within a fortnight. The third and fifth sprays should be of white oil, and the fourth of lead arsenate.

This spray programme gave excellent results at Harcourt last season, and the lead arsenate residue on the fruit was well below the requirements of the Health Act.

Lures of vinegar and water, fermented apple juice and water, or any other similar liquid, should not be relied upon to keep the moth in check, but they are useful to give a definite indication of the presence of the moth, thus showing when it is necessary to spray.

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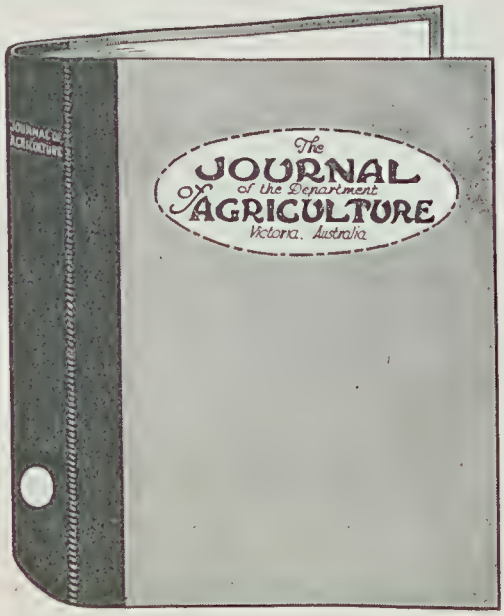

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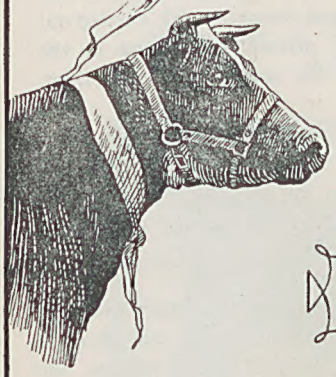

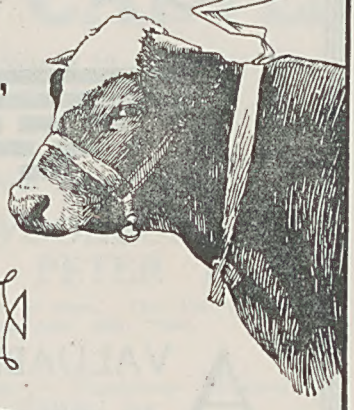

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		lb.	%	lb.	
1927-28	14	9,177	3·67	336·85	399·21
1928-29	10	13,644	3·41	465·24	512·74
1929-30	10	11,831	3·40	399·45	456·95
1930-31	13	12,763	3·43	431·92	500·01
1931-32*	10	10,116	3·69	369·00	417·00*
1932-33†	10	10,512	3·65	378·53	434·53‡
1933-34†	8	11,835	3·55	414·84	496·34‡
Average	75	11,335	3·53	396·79	461·29

* In 1931-32 the allowances for heifers were reduced. Under the old scale these averages would have been 429·00, 448·53, and 515·72 lb. respectively.
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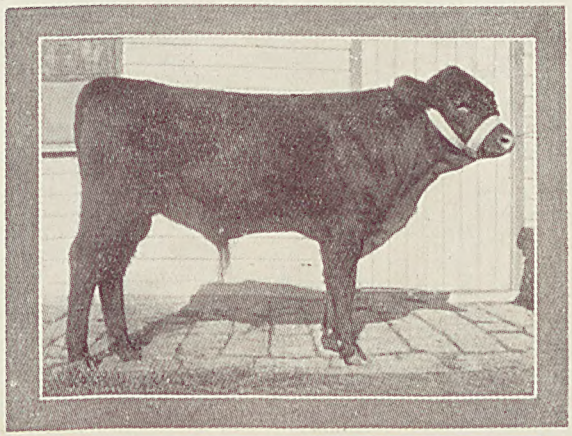

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Imp. in utero. (AA Vol. 7)
Born July 20th, 1932.

Sire : Peadowns Pierrot 15076.

Dam : Marsden Mindful 39913. Imp. (AA Vol. 7)

(The accompanying photograph of Woodburn Peter Pan was taken at 11 months old.)

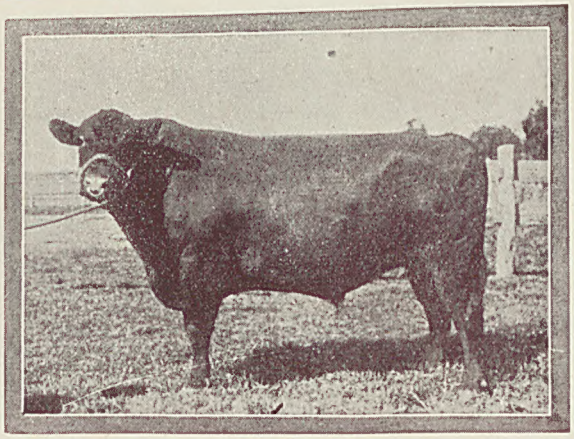
Herd Sire:

DOMINION BRIGHT BELGIAN

(1195A) [Imp. from N.Z. (A299 N.Z.)]

Sire : Dominion Brussells (1196A). (A113 N.Z.)

Dam: Dominion Bright Eyes (3112B). (B352 N.Z.)



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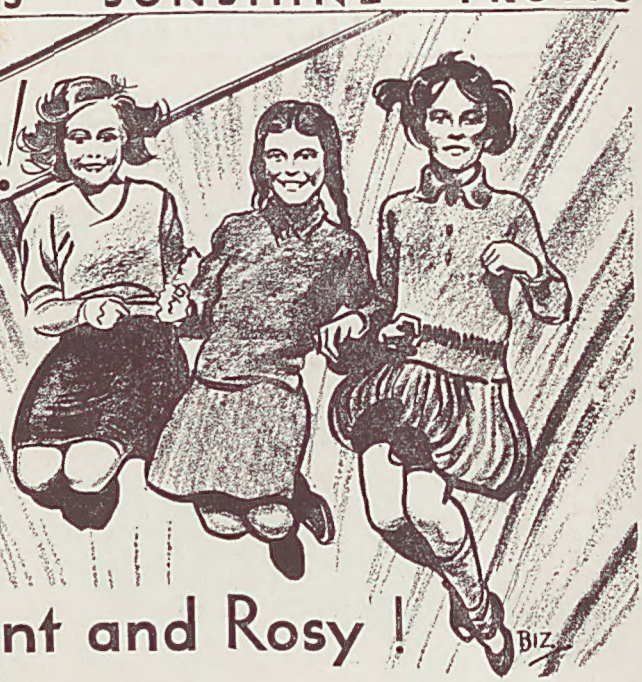

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